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Issue #71 March 1993

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# Contents

27

59

68

# On the Cover

Tom Larson, our new Assistant Editor and Shop Manager, isn't really new if you've been reading *Popular Woodworking* for the last seven years. He's drafted most of our plans, including the exploded perspective assembly drawings, and is a real stickler for accuracy. Just ask the rest of us who hang out in the shop, trying to get away with thumb and forefinger instead of a square!

Issue #71, March 1993 Volume 12, Number 5

A Popular Woodworking Project—**PullOut**™ **Plans**
**Forever Turning Whirligig** *by Anders Lunde* 27

A Popular Woodworking Project
**Antique Mirror Frame** *by W. J. Morrison* 30

A Popular Woodworking Project—**PullOut**™ **Plans**
**Gun Cabinet** *by Hugh Williamson* 34

A Popular Woodworking Project
**Cube Puzzle** *by Harold McAleer* 59

A Popular Woodworking Project—**PullOut**™ **Plans**
**Child's High Chair** *by Paul Gerhards* 60

A Popular Woodworking Project
**Make A Wooden Mallet** *by Bob Colpetzer* 64

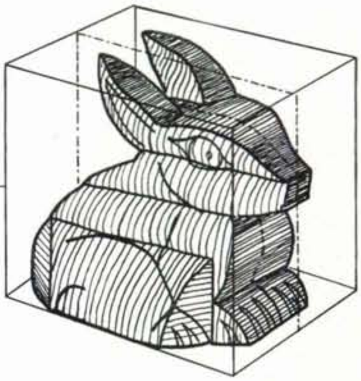
A Popular Woodworking Project
**Turned Toothpick Holders** *by David F. Black* 66

A Popular Woodworking Project—**PullOut**™ **Plans**
**A Simple, Graceful Dining Table** *by Ken Sadler* 68

The Mallet
**Carve A Bunny** *by Jack Ekstrom* 74

A Popular Woodworking Project
**Sweet Little Lemon Juicer** *by Don Kinnaman* 78

Wood Types
**Sassafras** *by Ken Textor* 84



## Columns

**Finishing Forum** 12
**Videoscene** 14
**Tried and True** 16
**Book Reviews** 19
**The Business End** 22
**Out of the Woodwork** 90

## Departments

**Turnings/Letters** 6
**Tricks of the Trade** 8
**News & Notes** 79
**Scrap Solutions** 80
**Classified/Calendar** 86
**Index to Advertisers** 89

# Turnings

So who's this Shop Manager who's now responsible for your favorite woodworking magazine? Let me introduce myself.

I grew up in the Air Force and have lived all over the US, Hawaii (before statehood) and Japan. My dad was a pilot and a career officer, so of course my earliest woodworking projects were made of balsa and had wings. I enrolled at Texas A & M University, but upon receiving my draft notice, I enlisted in the Army Warrant Officer Flight Training Program and ended up flying attack helicopters in Viet Nam. Afterwards, I returned to California, where my folks had retired, and went back to school. After graduating from U.C. Berkeley, I spent the next fifteen years managing other peoples' money at two national brokerage firms. I left the business when it stopped being fun. Since coming to *Popular Woodworking*, I've been working twice as hard, getting less sleep, but I've never had so much fun building and editing projects I hope you'll like.

Along the way I've been making things out of wood and anything else I could get my hands on. In Viet Nam, I built desks, bunk beds and dressers out of empty rocket boxes—the finish was high–temp blow torch, and varnish when I could find it. During my first marriage I built a lot of "honey–do's"—book cases, coffee tables and the like. Then I met a fellow who'd made his own airplane and was starting to build another. I signed on and spent several nights a week working fiberglass, foam and wood. We flew his Glasair right after Christmas, and by April, I had a Vari–Eze under construction. A few years ago another friend and I built three canoes. Right now I have three wooden kayaks under construction in my garage—my wife can't wait until they're launched. You've already been introduced to Linda if you have the July '92 issue (see the Roll Top Desk, part 1). Between us we have five teenage daughters—it's a noisy home, but I enjoy the young men who are starting to hang around (no woodworkers yet).

Enough about me—I want to see what you're up to in your shops—send pictures, I'll even print some! But just as important is hearing about what you want to see in these pages. What projects do you want to build, what new and old things do you want to learn, what are you looking for in a woodworking magazine? Write or call me and let me know. I can't make this your magazine without your input.

If you're truly inspired, take the time to tell us about your woodworking achievements, or that great design you came up with. Send us snapshots and a sketch or description—we'll try to share your work with the 284,000 other woodworkers who read and subscribe to *PW*. If you'd like a copy of our Writer's Guidelines, drop me a note and I'll mail one out the same day.

So until next time, whether you go with or against the grain, keep your mind turning.

Rob

P.S. A note on our Readers' Choice Winners: look for them in the March issue. The response was greater than expected (see the Letters column), and we have our hands full just keeping up.

# Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, Popular Woodworking, 1041 Shary Circle, Concord, CA 94518. Letters may be edited for publication.

## Timely But Tardy Ballots

Your Readers' Choice Awards was a great idea and gave me a good view of the different tools. And the giving away of the tools was really great, but how is it possible to get the ballot postmarked by December 1 when my copy of *Popular Woodworking* did not arrive until today, December 3?

Is this fair to your subscribers?

Robert Bower
Williamsport, Pennsylvania

*Needless to say, I got a lot of mail on this one. Sorry y'all. We were pushing it from this end to get the results into this issue, and there was a little delay in shipping the magazines. Many of you just sent the ballots anyway; some sent a letter explaining the late arrival and the ballot. Many others just sent a letter in which case I've attempted to call you. So here's the deal, at some point we have to start tabulating—that deadline is January 15th. Do you still want to be in the drawing for the $15,000 worth of tools donated by the manufacturers? If so, you have until March 1, 1993 to send your* unmarked *ballot with your name and address filled in—Ed.*

## Beg, Borrow, or Steal?

The January 1992 Clear Cuts raises an issue creating concern in woodworkers: when is it okay to "borrow" a design idea? Also, when is it not okay to "borrow" and what are the penalties that should be considered?

Unfortunately, yours as well as other magazines have failed to give the reader any guidance besides obvious common sense. Since your magazine is considered authoritative, it seems that you should have a qualified attorney or engineer prepare an article dealing with legal standards, guidelines, penalties for violations, etc.

I feel this would be a great service even if you have to stretch your magazine's present format to include such an article.

Tim Hill
N. Wales, Pennsylvania

On borrowing ideas. I agree. Making something for yourself or a family member who would not buy anyway is okay. I have seen people go to craft shows with cameras so they can copy your idea. Boo on them.

I have traded plans with other craftsmen, but if I am at the same show we do not display or sell the shared idea, and we have a gentleman's agreement of permission before anyone copies or markets any product.

Your Clear Cuts hit the copier right on the head.

John Matte
Oakdale, Louisiana

## Enterprising Efforts

I have a subscription to your excellent magazine and I really enjoy your high quality drawings and projects. I have just one question that I hope you'll answer soon. Am I allowed to sell any of the projects that I make from your plans? Please advise soon. Thanks.

Paul J. Higginbotham II
Peachtree City, Georgia

*Yes, we don't mind at all—Ed.*

## Insurance Litany

I heard some "somewhat frightening" news about my home–owner's insurance policy, which might be good to share with you and your readers. There are "new" policies out for homeowners regarding theft and fire.

They now require that you have proof of anything that was stolen or destroyed in a fire. They need actual video or color photos taken of everything in one's house including silverware, dishes, appliances, etc. This goes into the shop area also. Every tool grouping should be photographed and the photo put in a safe place in case of theft, flood, or fire. I guess there has been too much fraudulent listing of household and other items to collect insurance money.

Another suggestion is to list everything in the shop, no matter how large or small in a ding of "inventory sheet(s)," including a complete description, make, model and price when purchased, or at today's inflated prices. One copy should be on file at home in a safe place, one copy should be with a trusted friend or relative, and one copy should be with the insurance agent who writes the policy.

I've been working on an article on storage racks for hand tools and had planned to include this information, but I thought it best to send it in ahead of time to warn readers.

Don Kinnaman
Phoenix, Arizona

*We've also had some questions concerning Crafts Liability Insurance. What happens if people hurt themselves with a craft you've made and sold them? Anyone out there able to inform us?—Ed.*

## Rocking Horse Sense

I made the rocking horse in the November issue, and had trouble assembling the horse due to tolerances in the dimensions shown in Figure 4. The dadoes didn't match the combined thickness of the five body and leg pieces. The result was that when the legs were attached to the body, a poor joint resulted. I'd suggest that Figure 4 show the second dado cut as five board thickness combined spacing distance from the first cut instead of $3^{3}/_{8}$" from the end of the base. In addition, the cutting list for the rockers fooled me into buying a 6–foot 1 X 6 board using the $5^{1}/_{2}$" width. Please let other beginners know about this problem.

Guy Billings
Easton, Maryland

*Thanks for pointing out the discrepancies in the Little Rocking Horse article. The dimensions shown in Figure 4 will work IF the base board is exactly 12" long and IF parts A, B, C, E and F are exactly 3/4" thick. All dimensions should have been given from one end of the board and not both ends as shown. My apologies for the PullOut™ Plan of the rockers. The illustrator (that's me) put too much curvature in the rocker. Thanks again for pointing out the errors. Sharp–eyed readers like yourself are very much appreciated in helping us produce a better magazine.*

*Tom Larson, Assistant Editor*

## Boy, Oh Boy, Mr. Brooks

Just opened the January issue and got as far as page 7 before I had to sit down and respond to Donald Brooks' letter.

Why work wood? Why build birdhouses? Why not go to the dime store and just buy one? 'cause we want to do it ourselves, Don.

I'm a professional trim carpenter by trade and own and operate my own business. After 24 years I'm more in love with wood than ever. I love it because I never cease to be amazed at what you can do with it. I love how you can take a pile of boards and turn them into useful and beautiful things. My wife loves how she can have handmade furniture that is far better built and finished than any store–bought pieces, and that if such quality was available we could not possibly afford it.

And then there's those glorious moments when your houseguests ask you where you got that fabulous bedroom set, and you sheepishly grin and say, bursting with pride, "I built that myself."

That, Don, is why we work wood.

Joe Hoppenthaler
Gladstone, Missouri

*There were many, many other letters (too many to print) responding to Mr. Brooks. I'd like to thank all of you who took the time to write—Ed.*

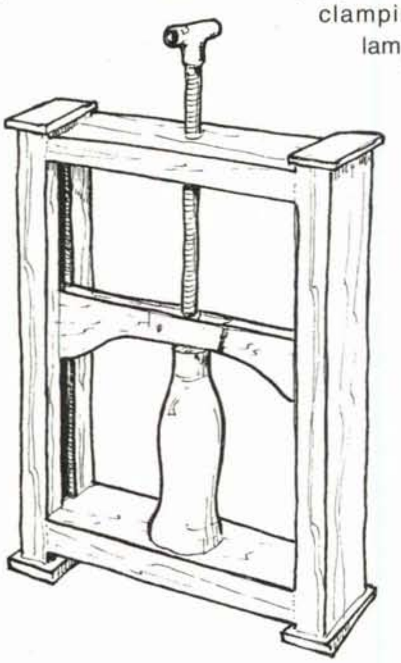
# Tricks of the Trade

Tricks of the Trade shares readers' tips for making woodworking tasks easier and safer. Send your original, unpublished ideas to Tricks of the Trade, % Popular Woodworking, 1041 Shary Circle, Concord, CA 94518. We pay $25 for each trick we publish.

All the tips on this page are from the workshop of Dick Dorn, an Industrial Arts instructor at Oelwein Community Senior High School in Oelwein, Iowa.

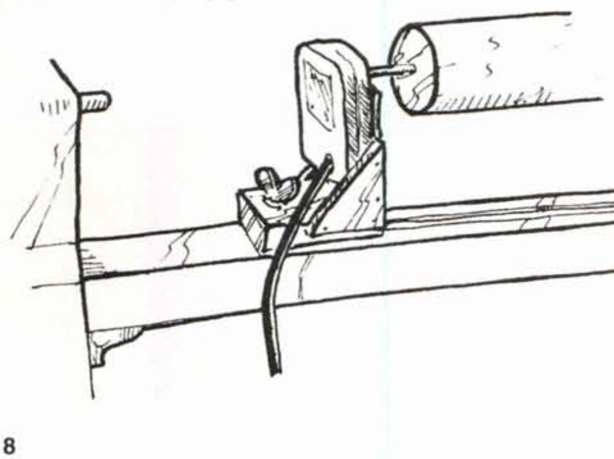
## Plywood Shop Press

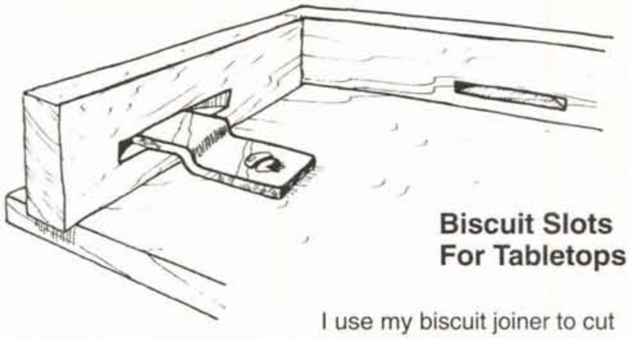
Sometimes clamps just can't do a proper job, so I built a press from laminated scrap plywood. A press is ideal for clamping such projects as lamps or pedestal tables. The rectangular frame has a groove in the vertical sides that guides the horizontal stabilizer and prevents the screw from twisting the work. The 1" screw turns through a nut that is welded to a steel plate, which is in turn secured to the frame. Adding casters to the bottom eases moving the press around the shop.



## 5 RPM Barbecue Lathe

An old rotisserie motor attached to the bed of my lathe turns the work slowly enough so I can paint turned pieces by hand or with a spray gun.



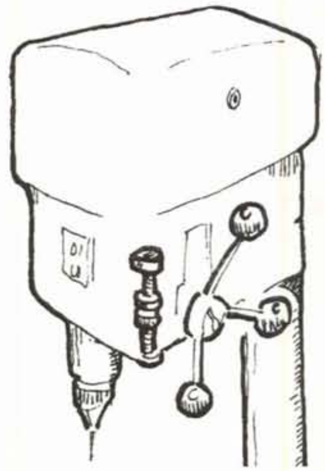


## Biscuit Slots For Tabletops

I use my biscuit joiner to cut neat slots for metal tabletop fasteners. The #0 setting is perfect. The normal procedure is to cut a full–length groove, but that weakens the apron.

## Prevent Lost Stop–rod Nuts

I use a 5/8" collar with a set screw at the very top of the stop–rod on my drill press. The collar prevents the nuts for the depth set gauge from working themselves up the threads, then falling to the floor and getting lost.



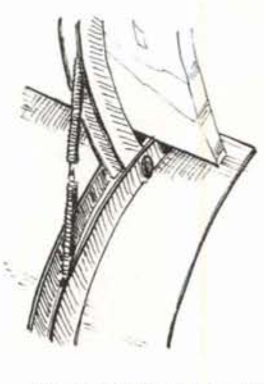
## Removing Splinters With Glue

I recently had a small splinter go straight into my finger. If I have to get splinters, I prefer the type I can remove with tweezers, but I couldn't see this one and it was painful when I touched it. So I ignored the little pest and continued with a large, time–consuming glue–up. When I had finished, I had several layers of dried glue on my fingers.

As I washed up and peeled the glue off my fingers, I noticed the little splinter was gone. Apparently the glue had adhered to the wood and the sliver was pulled out when I pulled off the dried glue.

## Quieting Rattles With Springs

My lathe shield rattles—especially when I have it in the raised position while sanding. I attached a pair of springs to the existing assembly bolts. Springs also work well to quiet the rattle in the door.



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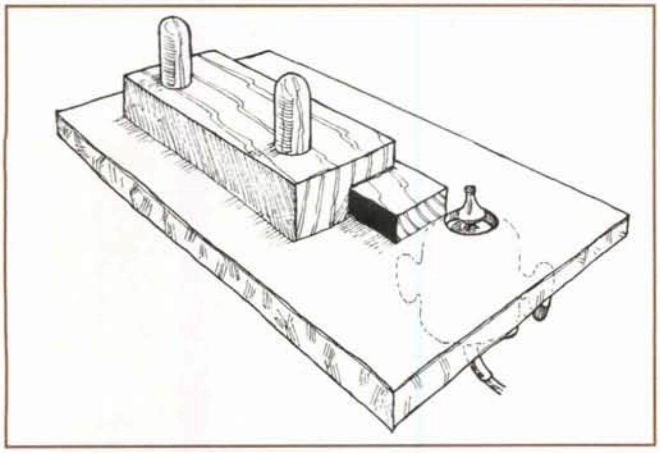
## Router Feed Jig

When I rout small pieces (2" or less), I use this jig to feed the stock. Sometimes the bit may kick back the stock at the beginning of the cut. To prevent this, start the cut an inch or so from the end, move the wood gradually into the bit, then pull the stock back to cut the 1" skipped. Make the jig twice as wide and 50% thicker than the workpiece. Cut a rabbet in one edge 1/16" smaller than the part and line it with 60–grit sandpaper. The length of the jig is variable, but don't exceed 18". Install two 1" wooden handles in 1" deep holes.

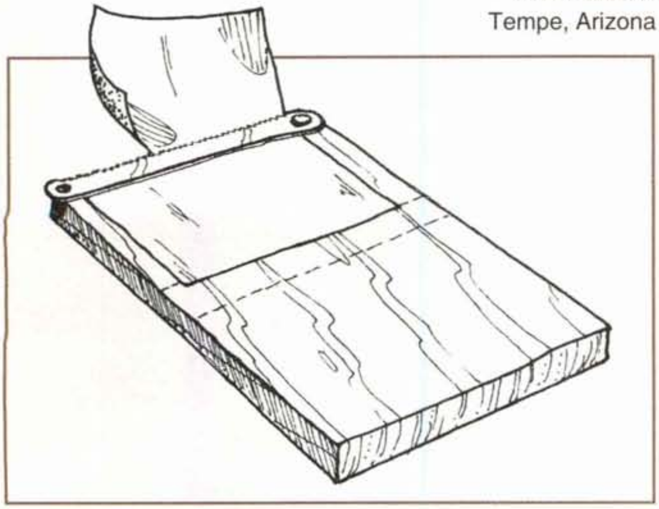


Garmon Coats
Watauga, Texas

## Sandpaper Trimmer

Instead of throwing away the occasional used hacksaw blade, make this handy sandpaper cutter for your shop. Cut a piece of 1" X 8" stock to the width of the blade. Put a slight bend in the blade so the ends curve up, then secure it to the board with a couple of screws. Pencil in lines across the board to mark the cut lengths for your particular sanders. Insert the paper under the blade grit side down, apply a little hand pressure to the blade, and tear.

Paul Zelenka
Tempe, Arizona



## Save That Moulding

Ever try to remove old moulding without destroying it? The nails usually stay embedded in the wood, and when you try to remove them, the wood splinters and you have a hole to patch. After carefully removing a piece, I use cutters to shear off the old nails on the underside of the moulding. There's no need to drive the nails back through the face, so there's no splintering or patching.

Howard E. Moody
Upper Jay, New York

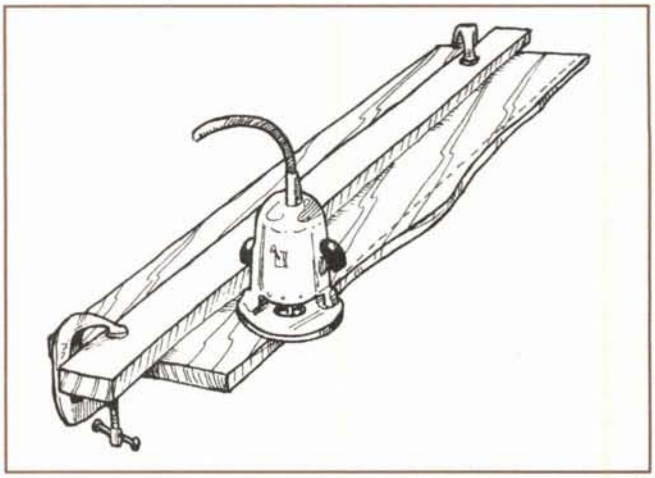
## Garnet Paper Backing

More often than not, garnet finishing paper consists of garnet particles bonded to very thin backing paper, which tears out quickly in use. Try backing these sheets with contact–type shelf paper (which is actually plastic). The garnet surface will wear out long before the paper tears.

Don Kinnaman
Phoenix, Arizona

## Edge Gluing Without A Jointer

Without a jointer or table saw, putting a straight edge on a board is a difficult task. I use my router with a straight bit and a straight edge—a piece of 3/4" thick plywood is ideal. It should be 6" to 8" longer than the workpiece for router run–off. The longer the straight edge, the wider it should be to prevent bending under pressure. Clamp the work to your bench; then clamp the straight edge to the work.



John Todd, Sr.
Holly Springs, NC

## Palette Putty Knife

I've found the artist's palette knife with its thin, flexible blade is a very handy item in the workshop. It works great for applying wood filler, and the rounded end is excellent for filling those inside corners, too. The palette knife permits much more control when filling cracks than does the putty knife.

Howard E. Moody
Upper Jay, New York

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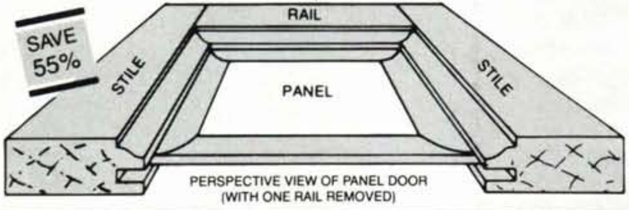
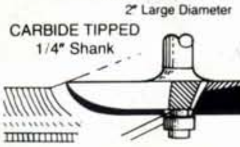
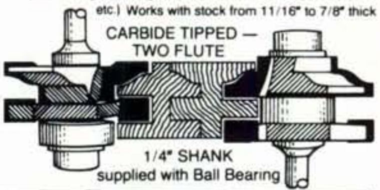


PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

**RAISED PANEL BIT**
SUPPLIED WITH
BALL BEARING



**REVERSIBLE COMBINATION RAIL and STILE BIT**
(For making matching rails and stiles in raised panel doors, etc.) Works with stock from 11/16" to 7/8" thick



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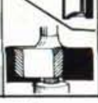
| ITEM NO. | BEST CUT BEST PRICE | DESCRIPTION | ANGLE/DEPTH/RADIUS CIRCLE DIAMETER | LARGE DIA. | CUTTING LENGTH | SHANK SIZE | PRICE |
|---|---|---|---|---|---|---|---|
| #601 | | 1/8" **Spiral Cutter** | | 1/8" | 1/2" | 1/4"* | $ 9.00 |
| #603 | Solid Carbide | 1/4" Spiral Cutter | | 1/4" | 3/4" | 1/4" | $12.00 |
| #903 | | 1/4" Spiral Cutter | | 1/4" | 3/4" | 1/2"* | $12.00 |
| #904 | | 3/8" Spiral Cutter | | 3/8" | 1" | 1/2"* | $24.00 |
| #905 | | 1/2" Spiral Cutter | *Proper Adaptor Will Be Supplied | 1/2" | 1 1/2" | 1/2" | $29.00 |
| #530 | | 3/16" **Edge Beading** | 3/16" Dia. of Circle | | 1/2" | 1/4" | $15.00 |
| #531 | | 5/16" Edge Beading | 5/16" Dia. of Circle | | 1/2" | 1/4" | $15.50 |
| #350 | | 1/8" **Round Over** | 1/8" R | 3/4" | 3/8" | 1/4" | $11.00 |
| #351 | | 3/16" Round Over | 3/16" R | 7/8" | 1/2" | 1/4" | $11.00 |
| #230 | | 1/4" Round Over | 1/4" R | 1" | 1/2" | 1/4" | $12.00 |
| #353 | | 5/16" Round Over | 5/16" R | 1 1/8" | 1/2" | 1/4" | $14.00 |
| #209 | | 3/8" Round Over | 3/8" R | 1 1/4" | 5/8" | 1/4" | $15.00 |
| #355 | | 1/2" Round Over | 1/2" R | 1 1/2" | 3/4" | 1/4" | $17.00 |
| #655 | | 1/2" Round Over | 1/2" R | 1 1/2" | 3/4" | 1/2" | $17.00 |
| #656 | | 3/4" Round Over | 3/4" R | 2" | 7/8" | 1/2" | $21.00 |
| #199 | | **Multiform Moulding** | Unlimited Patterns | 2 1/4" | 2" | 1/2" | $40.00 |
| #205 | | 1/4" **Cove** | 1/4" R | 1" | 1/2" | 1/4" | $12.00 |
| #206 | | 3/8" Cove | 3/8" R | 1 1/4" | 9/16" | 1/4" | $13.00 |
| #207 | | 1/2" Cove | 1/2" R | 1 1/2" | 5/8" | 1/4" | $14.00 |
| #643 | | 1/2" Cove | 1/2" R | 1 1/2" | 5/8" | 1/2" | $15.00 |
| #208 | | 3/4" Cove | 3/4" R | 1 7/8" | 3/4" | 1/2" | $26.00 |
| #231 | | 5/32" **Roman Ogee** | 5/32" R | 1 1/4" | 15/32" | 1/4" | $16.00 |
| #232 | | 1/4" Roman Ogee | 1/4" R | 1 1/2" | 3/4" | 1/4" | $17.00 |
| #506 | | 1/2" **Pattern** | Flush Trim | 1/2" | 1" | 1/4" | $15.00 |
| #508 | | 3/4" Pattern | Flush Trim | 3/4" | 1" | 1/4" | $17.00 |
| #366 | | 1/8" **Slot Cutter** | 3/8" Deep | 1 1/4" | 1/8" | 1/4" | $14.00 |
| #368 |  | 1/4" Slot Cutter | 3/8" Deep | 1 1/4" | 1/4" | 1/4" | $14.00 |
| #204 | | 3/8" Rabbeting | 3/8" Deep | 1 1/4" | 1/2" | 1/4" | $13.00 |
| #670 | | 3/8" Rabbeting | 3/8" Deep | 1 1/4" | 1/2" | 1/2" | $14.00 |

| ITEM NO. | BEST CUT BEST PRICE | DESCRIPTION | ANGLE/DEPTH/RADIUS CIRCLE DIAMETER | LARGE DIA. | CUTTING LENGTH | SHANK SIZE | PRICE |
|---|---|---|---|---|---|---|---|
| #211 | | 3/8" **Core Box** | round nose | 3/8" | 3/8" | 1/4" | $10.00 |
| #212 | | 1/2" Core Box | round nose | 1/2" | 11/32" | 1/4" | $13.00 |
| #418 | | 3/4" Core Box | round nose | 3/4" | 5/8" | 1/4" | $15.00 |
| #213 | | 1" Core Box | round nose | 1" | 3/4" | 1/2" | $17.00 |
| #548 | | **Lockmitre** | | 2" | 7/8" | 1/4" | $32.00 |
| #214 | | 1/4" **Straight** | plunge cutting | 1/4" | 3/4" | 1/4" | $ 6.50 |
| #216 | | 3/8" Straight | plunge cutting | 3/8" | 1" | 1/4" | $ 6.50 |
| #474 | | 1/2" Straight | plunge cutting | 1/2" | 1" | 1/4" | $ 7.00 |
| #219 | | 3/4" Straight | plunge cutting | 3/4" | 1" | 1/4" | $ 9.50 |
| #779 | | 3/4" Straight | plunge cutting | 3/4" | 1 1/2" | 1/2" | $10.00 |
| #462 | | 1/2" **Bull Nose** | 1/2" Dia. of Circle | | 3/4" | 1/4" | $16.00 |
| #464 | | 3/4" Bull Nose | 3/4" Dia. of Circle | | 1" | 1/4" | $21.00 |
| #764 | | 3/4" Bull Nose | 3/4" Dia. of Circle | | 1" | 1/2" | $21.00 |
| #545 | | **Tongue & Groove** | Straight | 1 5/8" | 1" | 1/4" | $29.00 |
| #845 | | Tongue & Groove | Straight | 1 5/8" | 1" | 1/2" | $29.00 |
| #546 | | Tongue & Groove | Wedge | 1 3/16" | 1" | 1/4" | $29.00 |
| #846 | | Tongue & Groove | Wedge | 1 5/8" | 1" | 1/2" | $29.00 |
| #450 | | 1/8" **Beading** | 1/8" R | 3/4" | 3/8" | 1/4" | $11.00 |
| #233 | | 1/4" Beading | 1/4" R | 1" | 1/2" | 1/4" | $13.00 |
| #454 | | 3/8" Beading | 3/8" R | 1 1/4" | 5/8" | 1/4" | $15.50 |
| #455 | | 1/2" Beading | 1/2" R | 1 1/2" | 3/4" | 1/4" | $17.00 |
| #500 | | 3/8" **Flush** | **Trimming** | 3/8" | 1/2" | 1/4" | $ 7.00 |
| #501 | | 3/8" Flush | **Trimming** | 3/8" | 1" | 1/4" | $ 7.50 |
| #503 | | 1/2" Flush | Trimming | 1/2" | 1" | 1/4" | $ 8.50 |
| #221 | | 1/2" Flush | Trimming | 1/2" | 1 3/16" | 1/2" | $ 8.00 |
| #558 | | **Thumbnail** | | 1 3/16" | 3/8" | 1/4" | $18.50 |
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# The Finishing Forum

by Tom Wisshack and Dick Fitch

The Finishing Forum is an ongoing discussion about the art of wood finishing. If you have a question or a problem to solve, we'd like to help. If you have a tip or secret to share, or you recently tried a new product, write to: The Finishing Forum c/o *PW*, 1041 Shary Circle, Concord, CA 94518. Letters may be edited.

## Bricks in Trouble

I added a sun room to my faced brick 1960 home and cannot clean up the seam where the old porch was taken down for the new addition.

I have a small sandblaster, but don't think it's worth all the trouble protecting the surrounding areas and cleaning up after. It should have been done before building.

I've tried wire brushing, muriatic acid and a few household ideas. The mortar responds harder to my attempts than the brick.

Can I repaint the bricks to match? They have never been painted.

Violet Wright, Philmont, NY

*I must confess, I have no clear picture of the extent and kind of defacement caused by the removal of the old porch.*

*I assume that the primary seam area is that caused by removing the porch roof. The removal operation likely exposed unweathered brick under the flashing, caulking and construction members. There is probably also some mutilation of the surface caused by removing fastening materials—i.e. nails, lag screws, braces, etc. There may also be deposits of tar or asphalt, rust stains and water stains.*

*I doubt that sandblasting would obliterate the seam unless it was followed by some artful repair.*

*Painting is perhaps the easiest and most effective way to hide the seam area. Before painting you must do some repair and surface preparation.*

*Replace missing mortar. Dry mortar mix is available at hardware stores or lumber yards.*

*Cracks, gouges and holes in the bricks can be repaired with mortar. A little red iron oxide mixed with the mortar may be helpful. You may want the advice of a contractor who specializes in patio work. Use this colored mortar only on the actual brick face and try to give some texture to the surface like the bricks. Do not trowel it too slick.*

*Any heavy deposits of tar-like materials must be scraped off. The remaining contamination can then be removed by scrubbing and rinsing with solvent. Mineral spirits will usually do the job.*

*Rust stains can be neutralized with Naval Jelly (available at many paint and hardware stores). Persistent water stains, rust stains and tar stains can be stabilized with a coat of aluminum paint. Do not paint the mortar.*

*If you want to paint only the seam area, opaque stain suitable for masonry surfaces is a good choice. It will retain some of the texture of the brick. Paint the brick face only, not the mortar.*

*If your facade is red brick, start with brick red opaque stain and go from there. Enlist the services of your paint supplier to help adjust the color. If necessary, you can make some color adjustments yourself. Use universal colorants; they are compatible with nearly all conventional stains and paints.*

*You may want to treat the brick-faced wall like the other three walls of the new room by painting the whole brick wall to match or contrast with the other three. Be sure to use paint and colors suitable for masonry surfaces. Allow areas where fresh mortar has been used time to dry and cure before painting.*

Dick Fitch

## Laquer Lowdown

*Smooth, level lacquer films, whether they are pigmented or clear, are largely the result of proper formulation of the lacquer and of the solvent blend used to dilute them. The greatest influence on the flow of lacquer is the rate at which the solvent leaves the film. Controlled solvent evaporation is necessary to overcome the physical effects of spray application. Sprayed lacquer is deposited on the surface in small globules that must have time to relax to a smooth level film. When the solvents leave the film too rapidly convection currents are produced and flow is inhibited. Rapid depletion of solvent soon brings the lacquer solids to a condition which precludes any flow at all. Lacquer given time to flow and level will be free from "orange peel". This flow time also allows the kinked and curled nitrocellulose chains to reach a linear orientation necessary for optimum film properties. Of course, slow solvent evaporation can be carried too far but a balance between flow and evaporation characteristics must be reached appropriate to the demands of the application.*

*Here are some other factors that may help:*

*1. Generally, lacquer formulated with high viscosity grade nitrocellulose exhibits poor flow.*

*2. The distance between the spray nozzle and the surface is important. Distances shorter than 6 inches can cause rippling. Distances much greater than 10 inches lose considerable solvent from the spray cone. Obviously, the solvent loss is also increased by increasing the width of the spray cone.*

*3. Air temperature is also a factor both in the spray booth and in the drying area.*

*4. Heated lacquers require solvent adjustments to have good flow. Heat reduces viscosity but also increases evaporation rate.*

*5. Within logical limits, thicker coats (not higher viscosity) usually have better flow. The rate at which the spray gun is passed over the surface affects the film thickness and thereby is a factor In flow.*

*6. After the first coat, each subse-*

---

***Tom Wisshack** makes and restores fine furniture in Galesburg, Illinois.*
***Dick Fitch** is the resident alchemist at The Bartley Collection, Ltd.*

*quent lacquer coat loses some solvent by absorption into the coat under it. Consider adjusting thinning after the first coat.*

*7. A deposited lacquer film increases in viscosity very rapidly as solvent leaves the film. Leveling is much more active in the earlier stages of drying before the lacquer becomes incapable of active flow.*

*8. The addition of minor amounts of very slow solvents or retarders has very little effect on flow. Large additions of such solvents can give some secondary flow but only at the expense of drying time and film properties.*

*It is reasonable to assume that major suppliers of lacquer finishes have carefully formulated their products. Advice from the manufacturer or knowledgeable supplier in choosing the right product should stand you in good stead. The thinner you use to dilute the product is equally important but is often chosen with little discretion.*

*As a guide, you may consider lacquer thinners blended with butyl acetate as the major active solvent for enhancing flow (MIBK is also satisfactory) Large percentages of ethyl acetate or MEK dry much faster but are questionable for most applications. With butyl acetate as the active solvent, xylene is probably a better choice for a diluent than toluene or low boiling naptha. There are, of course, many other laquer solvents and diluents from which to choose. Butyl acetate, however, is considered by many formulators to be the best active solvent for this purpose. Once again, your supplier can probably help you select a thinner that is right for your job.*

Dick Fitch

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| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | PRICE |
|---|---|---|---|---|
| C1001 | 1/4" | 3/4" | 2" | $^\$6^{00}$ |
| C1002 | 5/16" | 11/16" | 2" | $^\$6^{00}$ |
| C1003 | 3/8" | 3/4" | 2" | $^\$6^{00}$ |
| C1004 | 1/2" | 3/4" | 2" | $^\$8^{00}$ |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | PRICE |
|---|---|---|---|---|
| C1008 | 1/4" | 3/4" | 2-1/2" | $^\$6^{00}$ |
| C1009 | 5/16" | 3/4" | 2-1/2" | $^\$6^{00}$ |
| C1010 | 3/8" | 3/4" | 2-1/2" | $^\$6^{00}$ |
| C1011 | 1/2" | 1-3/16" | 2-1/2" | $^\$8^{00}$ |

## ROUNDOVER BITS with Bearing Guide

1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | RADIUS r | PRICE |
|---|---|---|---|---|---|
| C1175 | 7/8" | 3/8" | 2" | 1/8" | $^\$10^{00}$ |
| C1177 | 1" | 1/2" | 2" | 1/4" | $^\$11^{00}$ |
| C1179 | 1-1/4" | 5/8" | 2-1/4" | 3/8" | $^\$14^{00}$ |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | RADIUS r | PRICE |
|---|---|---|---|---|---|
| C1184 | 1" | 1/2" | 2-1/4" | 1/4" | $^\$11^{00}$ |
| C1185 | 1-1/8" | 1/2" | 2-3/8" | 5/16" | $^\$12^{00}$ |
| C1186 | 1-1/4" | 5/8" | 2-1/2" | 3/8" | $^\$14^{00}$ |

## DOVETAIL BITS 2 Flutes

1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | ANGLE a | PRICE |
|---|---|---|---|---|---|
| C1068 | 3/8" | 3/8" | 1-3/4" | 8° | $^\$5^{00}$ |
| C1069 | 1/2" | 1/2" | 1-3/4" | 14° | $^\$5^{00}$ |
| C1071 | 3/4" | 11/16" | 2-1/8" | 14° | $^\$7^{00}$ |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | ANGLE a | PRICE |
|---|---|---|---|---|---|
| C1074 | 1/2" | 1/2" | 2-1/4" | 14° | $^\$5^{00}$ |
| C1076 | 3/4" | 3/4" | 2-1/2" | 14° | $^\$8^{00}$ |

## COVE BITS 2 Flutes with Bearing Guide

1/4" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | RADIUS r | PRICE |
|---|---|---|---|---|---|
| C1141 | 1" | 1/2" | 2" | 1/4" | $^\$12^{00}$ |
| C1143 | 1-1/4" | 5/8" | 2-1/8" | 3/8" | $^\$14^{00}$ |

1/2" SHANK

| PART | CUTTER DIA. A | CUTTING LENGTH B | OVERALL LENGTH C | RADIUS r | PRICE |
|---|---|---|---|---|---|
| C1147 | 1" | 1/2" | 2-1/4" | 1/4" | $^\$12^{00}$ |
| C1150 | 1-1/8" | 5/8" | 2-1/2" | 3/8" | $^\$14^{00}$ |

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# Videoscene

by Alan Marks

**Build a Better Hardwood Floor** ©1991 (National Oak Flooring Manufacturers Association, P.O. Box 3009, Memphis, TN 3873–0009 (901) 526–5016 $12.00, 14 minutes.

For anyone who wants to avoid the many pitfalls of hardwood flooring installation, **Build a Better Hardwood Floor** is a useful how-to.

Directed toward professional installers, the video's main purpose is to ensure that any do–it–yourselfer can achieve maximum satisfaction from their installation efforts.

**Build a Better Hardwood Floor** devotes a great deal of time to the reasons behind the all-too common faulty installation and the steps to take to avoid them. Such tidbits of information as moisture content, cracks, cupping, and buckling are discussed along with the proper humidity conditions of a room for a successful installation. The video cautions against attempting to install a hardwood floor under high moisture conditions.

The video goes on to share some "installation tips" not commonly known or found elsewhere. Though the video does not walk the viewer through a complete installation, its real strengths lie in its basic information value.

***Alan Marks** designs and builds furniture in Carmel Valley, California*

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**Flooring** © 1988 (Lane Publishing Co., Sunset Books, 80 Willow Road, Menlo Park, CA 94025–9948, 800–227–7346 California residents call 800–321–0372) $14.95, 63 minutes.

Just about everything you need to know to install a floor is covered in this step-by-step demonstration. You'll learn such essentials as how to repair and refinish existing wood plank floors, various surface preparation techniques including the use of sanders, and parquet and prefinished strip flooring installation in mastic.

The second half of this video covers installation of vinyl floors — not at all within the realm of woodworking but informative and useful nevertheless. The handy little 37–page booklet that accompanies the video covers everything that is demonstrated visually plus a good deal of additional information. Sunset also publishes a more complete book on the subject under the same name.

**Decks** © 1988 (Lane Publishing Co., Sunset Books, 80 Willow Road, Menlo Park, CA 94025–9948, 800–227–7346 California residents call 800–321–0372) $14.95, 34 minutes.

If you've never built a deck before, **Decks** is the first place to begin before you begin this gratifying home improvement. Presented in easy-to-follow steps, **Decks** demonstrates the necessary preparation for and construction of a simple 12' by 14' rectangular deck, including elementary railings, for your home.

Though not produced for the experienced deck builder, **Decks** provides clear, concise, and comprehensive instruction for building the basic patio deck. Unfortunately, **Decks** leaves out any how-to instructions to build stairs for the deck.

A 22–page booklet accompanies the video and supplements it well, but no stair instructions here either. Sunset also publishes a companion book entitled **Patios and Decks** that builds on **Decks** and just might be worth a peek for the more complicated project–with stairs. PW

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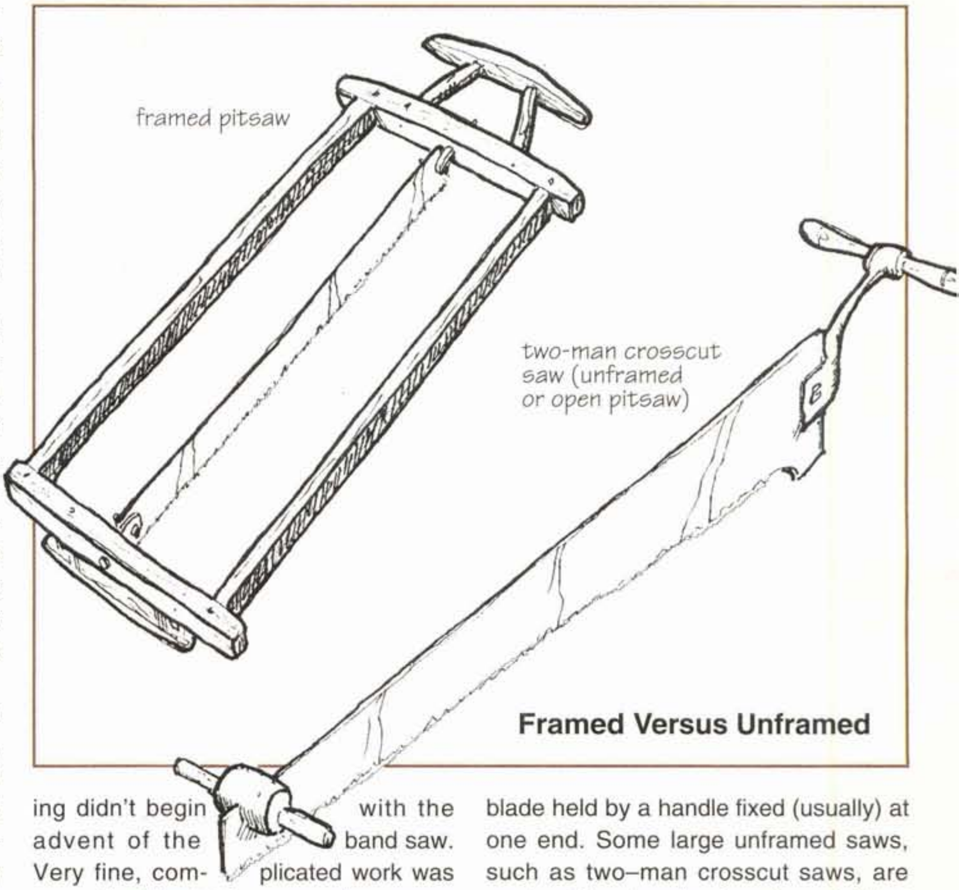
by John Watson

# Framed Saws: Life Before The Band Saw


framed pitsaw
two-man crosscut saw (unframed or open pitsaw)

**Framed Versus Unframed**

Of all the machines in the contemporary shop, the one I would be most sorry to lose is certainly the band saw. Table saws, jointers, planers, and power hand tools make life easier and speed up many tasks. They even impart a satisfying degree of accuracy to many jobs, but if pressed, I can do fine without them. To lose my band saw, however, would be a heavy blow.

It's a relatively mild–mannered machine and generally quieter than most stationary power tools. As with all power tools, it needs to be treated with respect, even though it's not as threatening as a shaper or thickness planer. Even large band saws hum along quietly with that gentle tick–tick–tick from the weld passing through the blade guides—it invites the workpiece to be twisted and turned against the ripping teeth of the blade.

This easy–going machine is capable of a great variety of work: it can rip, crosscut, resaw, cut perfect circles and make repeated pieces. It can be used with a fence or guide to produce multiple pieces of the same dimension, turn out matching tapered pieces, follow the most intricate patterns, and it's especially good for following freehand curves. There may be other, more specialized machines that can perform these tasks, but in most cases the band saw is a perfectly adequate substitute. In a small shop where time or money doesn't permit a complete array of machinery, the band saw is regarded by many as the best all–purpose machine to own.

## Life Before The Band Saw

What if your resources don't allow a band saw? The answer lies in how people managed for generations before the band saw was invented. A quick look around museums and antique shops should make it obvious that woodworking didn't begin with the advent of the band saw. Very fine, complicated work was wrought without this or any other power tool. How was it done? With hand saws, but not the kind of saw that springs to mind when the term *handsaw* is used. The saws that formed part of the woodworker's tool kit, from Greek and Roman times up to the beginning of the Industrial Revolution, were members of the framed saw family.

Apart from the common coping saw and its slightly more specialized cousin the fret saw, today's handsaws belong to the unframed family of saws. Unframed saws, like the common crosscut and ripsaws in your hardware store, have been with us only since the end of the seventeenth century. Before this time, most saws belonged to the framed family.

## Framed Versus Unframed

An unframed saw consists of a flat blade held by a handle fixed (usually) at one end. Some large unframed saws, such as two–man crosscut saws, are made with a handle at each end. What distinguishes an unframed saw, is the lack of a frame to hold the blade straight and taut. It was not until the seventeenth century before a blade could be made that was strong enough to be used without a supporting frame.

Although the unframed saw virtually supplanted the earlier framed models in America and other parts of the world, framed saws are still popular and continue to be used. It is a large family and though not all its members may be useful today, there are some that can still play a useful role—especially for the woodworker without a band saw.

## The Framed Family

Framed saws may be divided into two maingroups: frame saws and bow saws. Frame saws were designed primarily for ripping—cutting with the

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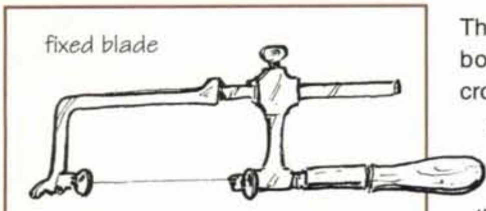
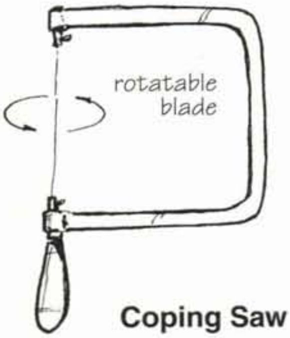
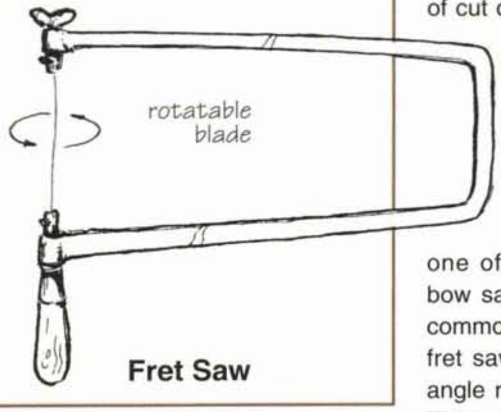
***John Watson** makes furniture and writes about woodworking in Inverness, California.*



**Jeweler's Saw**



**Coping Saw**



**Fret Saw**

grain. This use inspired the development of the first band saws.

The frame saw is made with a blade held between the two stretchers of a frame and the end pieces as attachment points for the blade. These stretchers were made far enough apart so they would clear the sides of the wood being ripped. Different size frame saws are used for different classes of work, such as giant pitsaws, smaller felloe saws (for cutting out felloes—sections of wooden wheels), and even smaller veneer saws.

The bow saw was designed to hold a narrower blade than a frame saw. The blade is held between one end of bow–like arms separated by a rigid crosspiece that provides the fulcrum to pivot the arms. An adjustable cord or bar at the opposite end of the arms from the blade is tightened, causing the ends holding the blade to stretch apart and tension the blade. Apart from the turning saw, whose blade is wider and intended mainly for ripping, the blades of bow saws are formed for cross–cutting.

The blades of frame saws are fixed and cannot rotate in their frame. Intended for ripping, their width helps keep the blade cutting straight, despite the tendency of the grain to twist the blade off its path. The blade of a bow saw is much narrower since it is easier to control a saw when cutting across the grain. It also allows the bow saw to cut curved shapes. Additionally, the blades are often capable of being turned in the bow so that the direction of cut can be at any angle to the plane of the frame and not necessarily in a straight line with it. This is useful when cross–cutting extremely wide boards, since the bow can be turned to clear the end of the board.

This is the principle behind one of the smallest members of the bow saw family—the fret saw. Like its commoner cousin, the coping saw, the fret saw's blade can be turned at any angle relative to the plane of its frame. This, plus the fact that its frame is especially deep, makes it ideal for twisting and turning when cutting detailed patterns in the center of a board.

## Using A Framed Saw

Few people are likely to use a pitsaw anymore. Felloe saws became obsolete with the disappearance of wooden wagons and wainwrights, but the smaller members of the family still have their followers. At first grasp, the bow saw can seem awkward or unwieldy, and when considering the band saw's effortless operation, can present an appalling prospect of the kind of hard work that used to make woodworking not a particularly enviable trade.

The larger saws were easier to use in several ways. Their wide blades guaranteed a straight cut, and their sheer weight helped the teeth bite into the wood. Neither of these advantages can be obtained with the smaller bow saws. They may not be heavy and tiring, but it can be difficult to start the blade and even harder to follow a line. A certain amount of practice and technique is necessary.

First, the blade must be properly sharpened (just like any other sawblade), sufficiently tensioned, and perfectly aligned with itself and the frame. Second, the saw should be grasped in both hands—the work secured on the bench or horse. This provides greater power and better control over the direction of the cut.

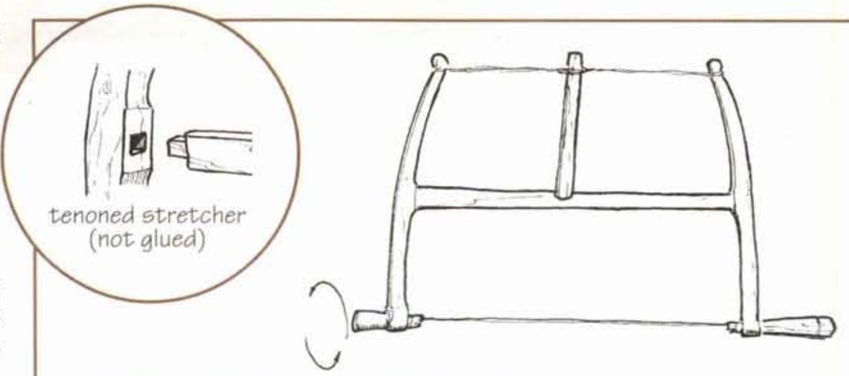
How much tension is necessary depends on the width and length of the blade, the overall size of the saw, and the size of its component members. Too much tension can damage the saw. Some saws are made with the cross member tenoned into the bowed arms. The tenon is usually shouldered, and assuming the blade is the correct size and properly fitted, the shoulders of the stretcher's tenons will bear evenly against the arms when the tensioning cord or bar is properly tightened. After a lot of use (or a little abuse) this relationship may not remain ideal and it will be necessary to make a longer stretcher with clean shoulders, or fit a shorter blade. This is often made from the old blade by hacksawing off a little bit from one end and boring a new hole for the pin that secures the blade in the arm.

Other types are made with a stretcher that fits over the arms with an open housed joint. This permits the arms to rock in the stretcher, and care must be taken to center the stretcher properly before tightening the adjustment. The aim is to secure the blade tightly enough so that it doesn't buckle on the cutting push–stroke—this depends on the hardness of the wood being sawed.

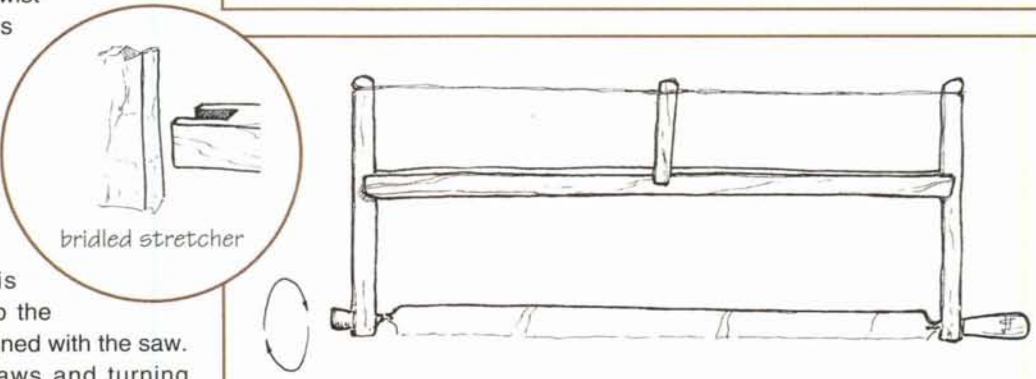
Unless there is a good reason to the

contrary, the blade should be straight and untwisted from end to end, and fitted in the same plane as the arms. On some saws there is no choice, as not all bow saws are turning saws. Other saws allow the blade to be twisted in relation to the frame.

One form of turning saw designed for cutting dovetails actually makes use of a twisted blade that enters into the work at one angle and then, as the bottom of the dovetail is approached, the other end of the twisted blade is used. Thus without changing the angle of the saw too much the blade cuts perpendicularly to its first action, cutting the bottom of the joint. But for general cutting it is most efficient to keep the blade straight and aligned with the saw.

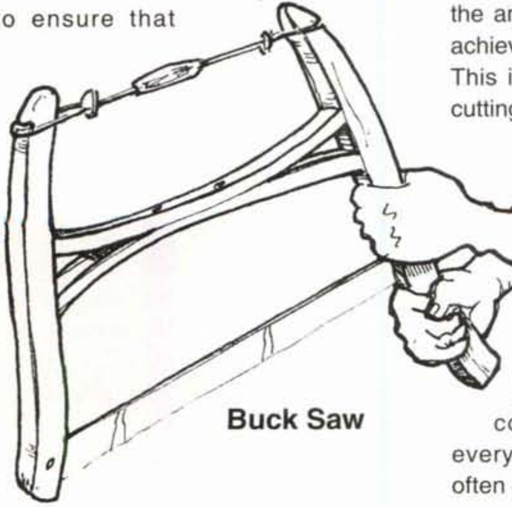


**British-American Style Bow Saw**



**Continental-European Style Bow Saw**

There are bow saws and turning saws made with one arm that extends below the blade. The buck saw is an example of this. These saws are best held with the right hand on the extension below the blade, the left hand across the chest to grasp the bow above the blade (vice versa if you're left-handed). If the saw doesn't have an extension, grasp the arm closest to the blade with your right hand and position your left hand above it. Keep the saw aligned with your right shoulder and use the frame's height and length to ensure that the cut remains perpendicular to the work and proceeds directly in front of you, much as you would sight along the top of a hand saw's blade.



**Buck Saw**

Start the kerf by drawing the blade backwards a few times until enough of a groove is made to guide the saw, and then saw lightly, without excessive downward pressure. Keep the blade approximately 45° to the work. If the saw wanders from the line, increase the angle to about 10° from vertical to achieved the correct relationship again. This is the method for general crosscutting. When ripping with a frame saw, use an overhand method—hold the saw more vertically, but still with two hands.

## Forgotten Saws?

Bow saws are once again being sold by specialty tool suppliers, and turning saws are still common in Europe. Practically everyone has a coping saw, though often erroneously referred to as a jigsaw. And even fret saws are not unknown. Not often regarded as such, despite being found in almost every woodworker's tool kit, the metal-cutting hacksaw is also a form of framed saw.

You may also occasionally meet with two other forms of framed saws, the buck saw and the metal-framed bow saw. The latter type consists of a large-toothed blade held in a metal bow and is commonly used for horticultural work.

The buck saw gets its name from its common use with the sawbuck, an X-shaped sawhorse designed to hold logs you're sawing into firewood. Although designed for cross-cutting, the blades are quite wide and coarse-cut.

Despite the prevalence of chain saws, there is still much to be said for the bucksaw, especially if you're not a full-time logger and only get to cut the occasional piece of firewood once in a while. It doesn't need to have its spark plug changed, it always starts, and best of all, it's neither smelly or noisy. PW

# Book Reviews

by Hugh Foster

**Shaker Woodenware: A Field Guide, Volume II** by June Sprigg and Jim Johnson (Berkshire House Publishers, P.O. Box 297, Stockbridge, MA 01262) 168 pages, paperback, $12.95

Although this is not a project book, this field guide will be useful to many woodworkers who are real fans of the Shaker Style. While there are plenty of plans for pseudo–Shaker pieces available, a study of the guide's photographs will lend itself to a reproduction project's authenticity. This volume covers wooden tools and utensils—chisels, spoons, brushes and combs, paddles, mallets, apple peelers and much more.

Experienced Shaker–style builders, will find this volume to be a useful, must have treasure.

**Polychromatic Assembly for Woodturning** by Emmet E. Brown and Cyril Brown (Linden Publishing, 3845 N. Blackstone, Fresno, CA 93726) 113 pages, paperback, $12.95

Originally published by England's Society of Ornamental Turners, this monograph does not make for easy or light reading. The diligent reader, however, will learn a good bit about gluing together woods of various colors and grains to produce beautiful objects on the lathe. The reader will also learn the mathematics, the close work to exacting tolerances, and, perhaps, the patience involved in turning combination blanks.

Experienced wood turners will probably only need to study the illustrations to have everything they need to understand this craft. The rest of us will have to work harder, however. The authors instruct the reader in general terms on how to go about studding, blocking, and segmenting.

This book will make you want to go out in the shop and give it a turn.

---

***Hugh Foster** is an English–teaching woodworker in Manitowic, Wisconsin, and the author of The Biscuit Joiner Handbook (Sterling Publishing, 387 Park Ave South, New York, NY 10016*

**How to Build a Wooden Boat** by David C. McIntosh (WoodenBoat Publications, Inc., Brookline, ME 04616) 255 pages, hardback, $36.00

Bud McIntosh set out early in life to build "The best boat in all the world." When asked for his definition of the best boat, he answered—"One just a little better than the one I have now." Over the past fifty years, McIntosh has built about 500 tons of boat in his search for the perfect water vessel.

In this book he describes how to build only one type of boat, using his own techniques and suggestions. Through trial and error, McIntosh has discovered the best and easiest way to perform each and all of the required boat-building operations.

Jonathan Wilson, the editor of WoodenBoat magazine, says McIntosh builds his boats "Quickly and cheaply—in the best sense of that word." He adds that McIntosh is better than anyone else at helping his readers to see the essential simplicity of each step.

This book is a beauty and was built to last. It's worth a look even if you don't plan to build a boat.

**George Nakashima: Full Circle** by Derek E. Ostergard (Weidenfeld and Nicolson, 841 Broadway, New York, NY 10003–4793) 192 pages, hardback, $60.00

George Nakashima is famous as the elder statesman of fine woodworking. His previous book, **The Soul of a Tree**, is arguably one of the most beautiful woodworking books ever published, but it is his woodwork, built over the last fifty years or so, that remains his crowning achievement. **Full Circle's** ambitious mission is to catalog that work. Elegant essays by Sam Maloof, Derek Ostergard and Nakashima himself show how Nakashima's low–tech workplace has helped to shape the modern arts and crafts movement.

Among the pieces expertly photographed in this volume, are the inspired "Altar for Peace," made for the Cathedral of St. John the Divine in New York. Nakashima interprets woodworking as an act of spiritual growth and it is in this spirit that Nakashima's work is presented.

**Wildfowl Carving** by Roger Schroeder (Stackpole Books, Cameron and Kelker Sts., P.O. Box 1831, Harrisburg, PA 171105) 312 pages, hardback, $49.95

**Wildfowl Carving** is a fine example of the American bookmaker's art—it is handsomely bound and beautifully printed with black and white and full–color photos on nearly every page.

Ten different carving teams discuss the various aspects of bird carving including: Planes, Lines and Focal Points, Miniatures, Hand Tools and Hardwoods, Theories of Design, Vignetting, Capturing Essence, Orchestrating Balance and Harmony and more. The work is both mature and creative—it would be difficult to choose a favorite chapter. If you're interested in carving at all, this is a volume you'll come back to time and again.

**Scroll Sawn Shelf Patterns** by Patrick Speilman & Loren Raty (Sterling Publishing Company, 387 Park Avenue South, New York, NY 10016–8810) 128 pages, paperback, $12.95

Here's a worthwhile project book. Pat Speilman and Loren Raty provide patterns for over fifty styles of ornate scroll sawn shelves. These are not storage shelves, but shelves to display small objects and treasures. They are projects that can be nicely done with quarter–inch plywood or attractive solid woods.

Mostly Victorian in design, these decorative shelves are accompanied by full–size patterns. The authors provide a bounty of helpful tips—how to cut as many as six copies of the same pattern at a time or how to use a photocopier to enlarge or reduce the existing shelf pattern to accommodate the objects you intend to display on it.

This "gingerbread" style abounding in this volume goes a long way and is one whose popularity has been revived continually. PW

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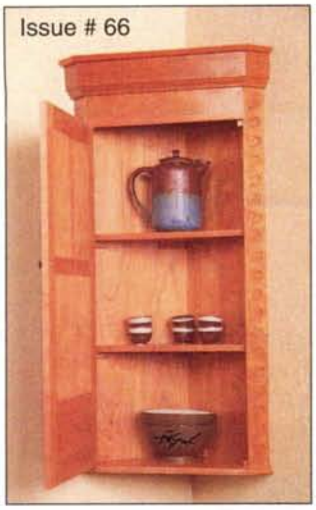
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by Ken Sadler

# From Teacher to Entrepreneur

Bill Bolstad began his career as a teacher. Today he runs a thriving woodworking business which he and his wife Nan built from scratch. Bill did get here from there, though it took twenty years.

After Bill got his Master's Degree in Industrial Education from Iowa State in 1969, he took a job teaching industrial arts at a junior high school in St. Paul, Minnesota. He taught there for nine years. Teachers, at least in those days, had their summers and weekends free. Bill and Nan used this time to turn Bill's hobby of woodworking into a business.

In 1978 they moved to Willamina, a small town in Oregon's timber country. They bought some land just outside of town, built a sizable shop alongside the house, and devoted themselves to the business full–time. By 1988 their business outgrew both the shop and Willamina, so they moved to larger quarters in Salem.

Over the last twenty years, Bill and Nan have built a life and a business that expresses their idea of living. They have been able to integrate their life, their children, and their work in a way that is only possible when you are self–employed. The Bolstad's story serves as an inspiration to others who dream of turning their hobby into a business. So here, in their own words, is how they did it.

*How did you start your woodworking business?*

I started out making plastic sculptures. Then I started carving wooden sculptures and finally boxes. This was when art fairs were becoming popular, so we started building products to take to the fairs. The boxes sold the best so I figured that was the way to go.

*What gave you the idea of going into furniture?*

We built some case goods about ten years ago and although I've always done some of that work—we really depend on the boxes for a living. We didn't have much success with the case goods, and I don't particularly like to make them.

We've been making the tables and stands for about a year and a half on a semi–production basis. I have one person that works on the tables and stands—he produces about thirty of them a week. So far this year, we've sold everything he has produced.

*How did your design philosophy develop as you evolved your style?*

We decided that we wanted to make a quality crafted product that was functional. After we experienced a downturn in sales we decided to set ourselves apart from the other box makers by concentrating on our interiors. We're now making a very functional jewelry box interior.

*Where do you get your wood?*

We make our cases out of eastern walnut and maple that we buy wholesale. We use Oregon woods for the lid inserts because it's more beautiful, and more figured than the eastern woods.

*Do you spend quite a bit of time and money acquiring wood?*

In the past I've bought the burls and logs and cut them myself, but that takes too much time away from production. It's better to just call up someone and have the wood shipped to us. Our wood cost is between 10% and 12% of the wholesale price of the product.

*That would be true for the wood you use for the cases, but what about the inserts?*

Our redwood burl inserts are purchased from a fellow in California that cuts it into blocks for us and ships it up here. It took me a while to find that source. I'm still looking for a similar source for the maple burls.

*At the start, how much did you invest in equipment?*

We had about $2000 worth of equipment when we moved from Minnesota. We had a circular saw, a jointer, a 6" X 48" sander, and a drill press. Those were all tools that I'd bought when I was just a hobbyist. When we moved here to Salem we bought a 36" bandsaw and an edge belt sander—so in the

---

***Ken Sadler** is a retired furniture maker in Portland, Oregon.*

first two years we invested about $5000 in equipment. Today we've invested about $70,000 in equipment.

*Have you been able to buy the equipment outright?*

Anything under $5000 we paid for outright, for anything over that amount—we borrowed the money and have already paid it off.

*How long did you and Nan work by yourselves?*

About five years. Today, Nan takes care of the business end of it and the finishing. I get the boxes ready for finishing and run the shop production. We share the selling responsibilities, and we both work on new designs.

*As I recall, at one time you hired a couple of people to do your sanding and you found out that it didn't pay—so you let them go.*

Yes we did let them go, but it was the personality of the people involved, it wasn't the idea of having somebody come in and work for us. The next fall we hired somebody to do sanding and assembly for our Christmas rush. It worked out quite well. That particular person worked for us for four years.

*Would it be of any advantage to subcontract your work rather than expanding the shop?*

No, we need to expand the shop so that we can cover our overhead. We need the work, we don't need somebody else doing it for us.

*Do you have trouble finding people you feel are skilled enough to produce your pieces?*

Yes, we've gone through our share of people. Now we have five employees and they're the best crew we've ever had. They're very quality conscious, they all get along and work very well as a team. They're very proud of what they produce, because they feel like they're a part of it.

*Did you have to train any of them?*

Of course, it's an on–going training situation for each one of them. Whenever they master a task, I want them to learn another one. We constantly challenge them. They were not woodworkers at the start, but now they've been trained to do multiple tasks.

Basically we've taught them how to do certain tasks and they do those operations quite well. I have one person who does the tables from start to finish. But there some tasks that certain people

know they couldn't do.

*Do you have health care for your employees?*

Yes, we have health insurance. It's a $500 deductible policy. We also started dental insurance this year.

*Often I hear small business owners claiming that if they're forced to buy health insurance for their employees, they'll go out of business. You seem to refute that.*

Insurance costs us fifty cents an hour, but I believe a healthy employee is a better employee. If they've got health care—it's one less thing in their lives that they need to worry about. This is not a Cadillac policy—it's a bare bones policy, but if I can't offer my people health insurance I don't have any business being in business. I think we should have national health care, but as long as we don't have it, I feel I have to offer something to my people.

*When you instituted the insurance policy four years ago, did it make any appreciable difference in your net earnings?*

No, because we looked ahead into the costs and we raised our prices 5% to cover some of those costs. In spite of the price increases we had better sales than the year before. Obviously, the price increases didn't harm us and I think we have better employees because of the health insurance. We can ask more of them because they feel like they are being taken care of.

*How do you handle your shipping?*

Every one of our products is individually boxed, so when we design a product, we have the standard box sizes in mind. That way we don't have to order custom boxes. These boxes are designed to be shipped UPS, too.

*What about the cartons you ship orders in?*

We have four different sizes of cartons because our orders are so varied. We pack the various items for an order in one of the cartons and fill the remaining space, if any, with plastic popcorn.

*What was your first marketing strategy?*

When we were in Minnesota, we had our own gallery where we sold our products and the products of other crafts people, mostly pottery and jewelry. Then, before we moved to Oregon, we did our first wholesale show which was back in Frederick, Maryland. There was a promoter who did a craft show for wholesalers only. Our second show was the Pacific Design Center in Los Angeles. Today, the wholesale shows have gotten bigger. We now do a craft show that has 1600 exhibitors and the first show we did had only 100.

*How many shows do you enter now?*

Last year we did five, but this year we will do only three. We've cut back because we found that at the two gift shows we did in New York did not sell enough to justify the expense of going. Our other three shows are in Philadelphia, Boston, and San Francisco. The promoter of these shows emphasizes the production and marketing of crafts.

*How do the shows operate?*

First, you submit slides and your work is judged. You're evaluated not only according to your work, but whether you have a brochure and a price list, and whether you have any kind of business sense at all. If you're accepted, you send in your money. Then you have to build your samples—plan and build a display booth and prepare your price list and brochure. The brochure is important because not everyone is going to order at the show and you have to have a list the others can take with them for future ordering.

Before you go to a show you have to plan how much you're able to produce. If you have six people walk up to the booth and they all want everything at the same time, you might not be able to produce it and you need to be able to tell them when they can expect to get their order. About one-third of our annual sales come from the shows.

*Who attends the shows?*

Generally buyers from stores and galleries that sell hand-crafted items. You also get representatives from jewelry stores, department stores, catalogue houses, and interior decorators. About 85% of our customers are acquired through the shows.

*What is the entire cost of participating in a show—including transportation, hotel, food, product shipping to and from the show, and the entry fees?*

It depends on the show, the costs have been between $3000 and $6000. The New York Gift Show was costing us $6000 a show, or $12,000 a year, because there were two shows. To do shows on the East coast is more expensive because we have to fly. Shipping our booth and display samples are more expensive. It costs us about $4000 to do a show on the East coast. On the West coast, if we drive, we can do it for about $2500.

*What happens to the shop while you're at a show?*

We have dependable people. Before we leave, we line out what work has to be done and when we come back it's finished.

*When did you start selling through galleries?*

We've always sold through galleries, starting with our own back in Minnesota. We usually sell our products to galleries outright, but we have a couple of local Oregon galleries that we do on consignment so we can try out new ideas. We did this with the tables—that way we got a chance to see what people wanted.

*What percentage do the galleries and stores take?*

We have a wholesale price that's set. That's what we sell for. The galleries on the West coast mark it up less than those on the East coast. After the gallery or store has bought our product, what they do with the price is not our business. In the galleries that we consign to, we double the wholesale price and that's what they charge.

*How do you contact galleries in other parts of the country?*

We advertise in a magazine called *Niche*, it goes to interior decorators, buyers from department and jewelry stores and galleries. Their circulation is about 30,000. We constantly get inquiries from that ad. Buyers who see the ad will look us up at the next show and the order will be written there.

*You would consider the ads very important, but not as important as the shows?*

That's right. You see, the ads keep our image out in front of the public. They allow us to show new products, and they give us a chance to reach a different market than the shows. *Niche* comes out four times a year, between

the times of the shows, so the ads give us a chance to continually remind buyers about our products.

*Do you encourage buyers to phone in their orders?*

Yes. We have an 800 number now that appears on all our printed material, ads and show displays.

If a buyer has one our products in their store and one of their customers wants a different kind of wood or perhaps a box that's a little different, the store doesn't hesitate to call us and ask about it. And they're going to call us first if they don't have to pay for the call.

Another thing that we do to keep in touch with our customers, is to publish a newsletter four times a year. In it, we try to keep our customers abreast of what kinds of wood are selling best, and which boxes are getting the best reception. We try to write not just for the buyers, but so the buyers can share the information with their sales force. They're selling a hand–crafted box so they need to know something about the people who built it.

*Do you sell anything though distributors or sales representatives?*

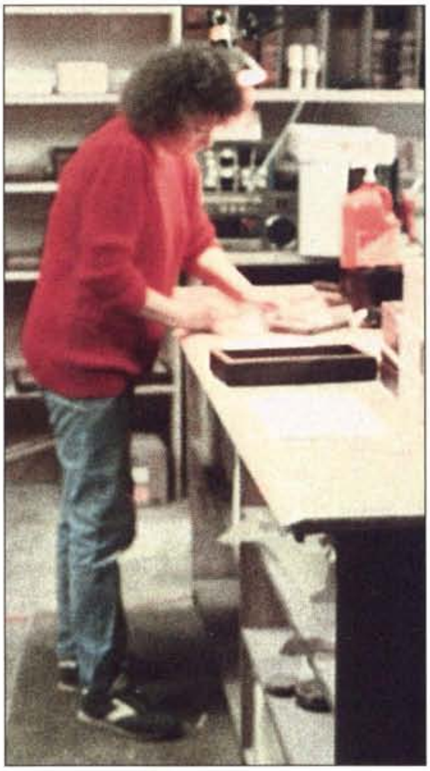
No. We've had very poor luck with reps. We feel the problem is that we're selling a handcrafted product, and as soon as you introduce another person in the chain, you lose the personal touch. When you sell a handcrafted product you're actually selling something of yourself—and that's what the people are buying. Sales reps don't have that rapport with the customers. They can't represent you like you can represent yourself.

*Do you use the same marketing strategy for all your products?*

Yes and no. You see, we generate seconds that we have to get rid of. So we sell some of our seconds to stores and we have an annual seconds sale where the public can come into the shop and buy seconds or first quality products. We are planning on doing some retail shows where we can sell our seconds.

*What percent of your sales comes from selling seconds?*

About 2%. A lot of the items that we consider seconds, most people wouldn't. We usually price them halfway between wholesale and retail. The retail shows are not particularly profitable, but we have to do something with the seconds. We have no other outlet and we can't just let them sit.



*How did you set prices in the beginning?*

In the beginning we didn't know how to set our prices according to cost—we just guessed. We decided to price our products based on what we thought someone should pay for them. We could have set them higher, but since we hadn't made a name for ourselves yet, we probably wouldn't have sold as many boxes.

*How long did it take you to start making a living from your work?*

It took about four years. I was still teaching during that time. We were working during the summers and weekends year round. It took four years of part–time to get the business to where it would support us full time. Our present gross annual sales are about $410,000. In our first year it was about $35,000.

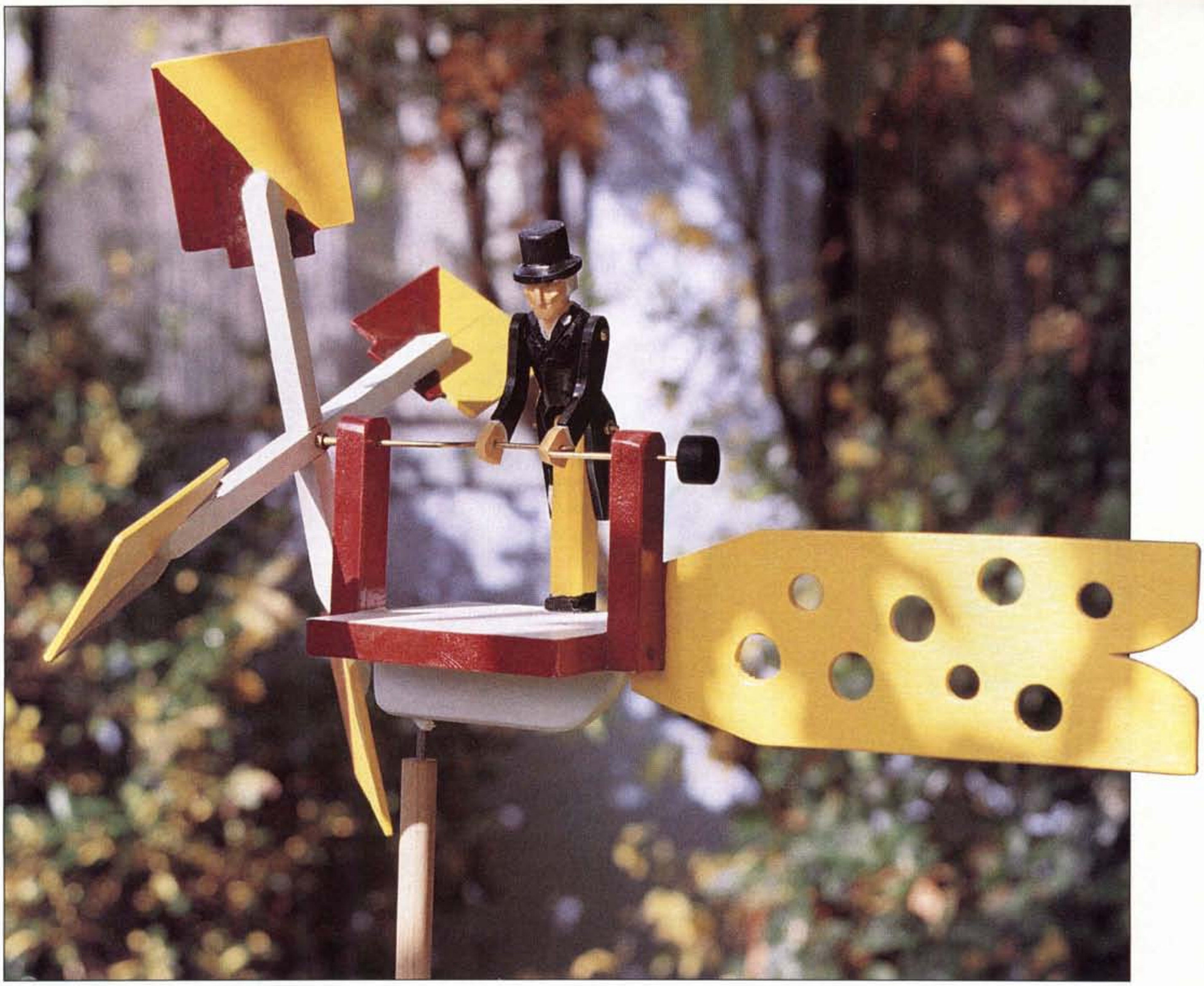
*What is the most important aspect of your business?*

My wife and I being able to work together and to be around our kids as they grow up. When we were in Willamina—the shop was right beside the house. This business has enabled us to have a lifestyle that allows us to choose our activities. It's been flexible enough to allow us to do special things with our kids that, people with full–time jobs would not be able to do. We've been able to travel with our kids to the shows. They've worked in the business since they were old enough to help out and still do on certain occasions.

Also, we feel our employees are part of our family. In this small business, we have a camaraderie with our employees. They feel that they are a very important part of the process. One of the things that Nan did in the newsletter was to write a short sketch about our employees and their interests. All of the people from our shop were very proud of that newsletter and they took it home and showed it to everyone.

Our people don't work for us—they work with us and they're important to us. I think we're important to them not just because they work for us (we don't necessarily socialize outside the workplace), but while we're here, we're a team and everybody works together. In September Nan and I had our twenty–fifth wedding anniversary and our employees brought us a cake and we celebrated the occasion with them. To us that says an awful lot.

*So there you have it. If you have a small shop now or are thinking of expanding your hobby into a small business, there is a lot to be learned from the Bolstad's story. You don't have to be an experienced woodworker who lives in a big city, nor do you need to have a lot of money or expensive machinery. What you do need is the confidence that you can start a business, the determination to succeed, and the enthusiasm for your work that will keep you going through rough times.* PW



# Forever Turning An Old Time Whirligig

**by Anders Lunde**

This whirligig is modeled after a museum specimen. I've seen only a few antique whirligigs where there's a direct relationship between the propeller and a moving figure. Here, a man appears to crank the propeller. The figure and propeller are linked by the camshaft. There are no connecting rods, gears, or complex mechanics. For steady movement, the four-bladed propeller has a 17" diameter.

Cut out parts (A–I) as given in the Cutting List. Cut the profiles of pieces (B), (C), (E), (G) and (I) as given in the full-size PullOut™ Plans. There are full-size front and side patterns for the torso (E). Drill a 3⁄16" diameter through hole 4" from the bottom of the leg. Line the hole with a piece of 1⁄8" ID tubing.

Draw center guide lines on the top and bottom of platform and mark the location of the leg as shown in Figure 1. Drill and countersink the holes in the platform for the leg and the support piece screws. Drill a pilot hole in the leg so it will not split when attached. Secure the leg and the support piece to the platform with glue and screws.

Drill a 3⁄8" diameter pivot hole 1¾" deep through the support into the platform as located in the support pattern. Since the leg is already mounted to the platform, it's necessary to drill the pivot

---

*Anders Lunde is the author of several books on whirligigs, including* Whirligigs in Silhouette *(KC Publishing, Inc.) and* Whirligigs for Children: Young and Old *(Chilton Book Company).*

**Forever Turning**

**Cutting List**

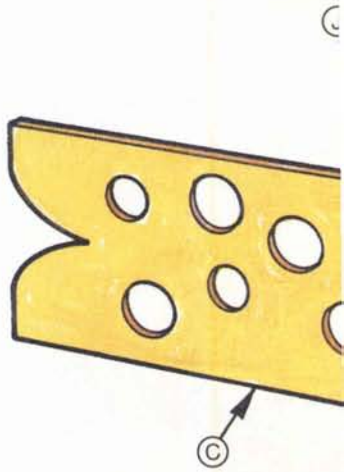
| | | Finished Size | | | |
|---|---|---|---|---|---|
| **Qty** | **Part** | **T** | **W** | **L** | **Piece** |
| 1 | A | 3/4" | 6" | 6" | platform |
| 1 | B | 3/4" | 1½" | 6" | support |
| 1 | C | 1/4" | 4" | 12" | rudder |
| 2 | D | 3/4" | 1" | 5" | sides |
| 1 | E | 1½" | 1½" | 6½" | torso |
| 1 | F | 3/4" | 1" | 4¼" | leg |
| 2 | G | 1/4" | 1¼" | 3½" | arms |
| 2 | H | 5/8" | 5/8" | 12" | prop arms |
| 4 | I | 1/8" | 3½" | 4½" | prop blades |
| 1 | J | 1" diam. | | 5/8" | eccentric wheel |

**Supplies**

| | |
|---|---|
| 1 | 3/8" X 2" tension pin |
| 3 | 3/16" OD X 3/4" tubing |
| 1 | 1/8" X 2" rod threaded both ends for #6–32 |
| 4 | #6–32 machine nuts |
| 2 | #6 X 1" RH screws |
| 1 | 1/8" X 12" rod threaded one end for #6–32 |
| 2 | 1/8" ID washers |

hole with the platform/support assembly resting upside–down on the side of a table. The pivot socket consists of a liner made from a 3/8" X 2" long tension pin and a cap made from the head of a 16d nail (Figure 2). I've found tension pins work well for this purpose because of their strength and beveled leading edge (an alternative liner can be made from 1/4" ID tubing). For a spindle, I use a 20d or 30d nail with the head cut off.

Carve the head and face of the figure as shown in the torso patterns and on page 27. Drill two pilot holes in the shoulders for the arm screws. Make the leg axle from a 2" length of 1/8" diameter rod. Thread both ends of this axle 3/16" in from each end to receive #6–32 machine nuts. A rod bent at the ends will also work, but the threaded axle is preferable for smooth rotation. Drill an 1/8" diameter hole through the coat as located in the PullOut™ Plans for the axle and fit the figure to the leg. It may be necessary to trim the top of the leg to permit free movement.



Drill 3/16" holes in the shoulder and hand of each arm as located in the PullOut™ Plans. Drill and countersink holes in the two side pieces in order to attach them to the platform. Drill 3/16" diameter holes for the camshaft 3/4" from the top of the side pieces and line them with tubing.

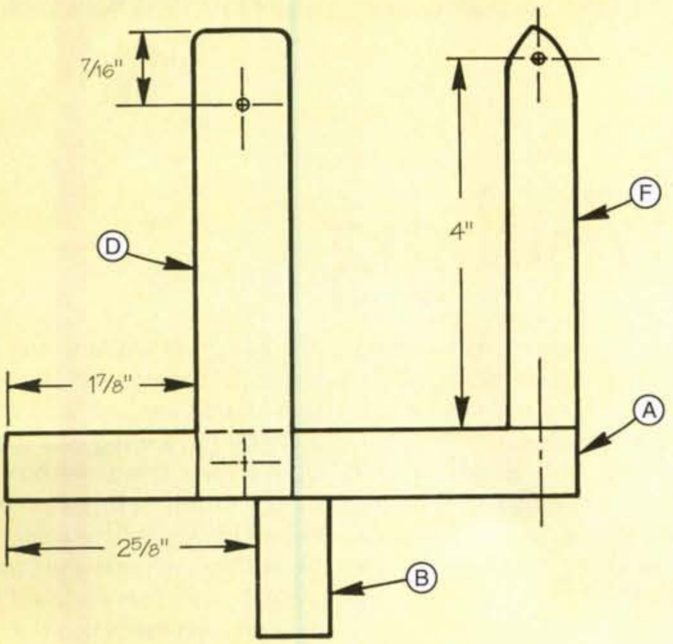


Figure 1. Platform Subassembly

Make the camshaft from a 12" length of 1/8" diameter rod. This rod can be purchased pre–threaded or you can do it yourself. The threads extend 1" from the propeller end. Bend a cam 1" deep and 2½" wide in the rod beginning at 4¼" from the propeller end.

Put the arms into the camshaft, correct side up, and attach them to the torso with 1" #6 screws for axles. Put the ends of the camshaft into the side pieces. Temporarily, hold the side pieces in place on the platform and turn

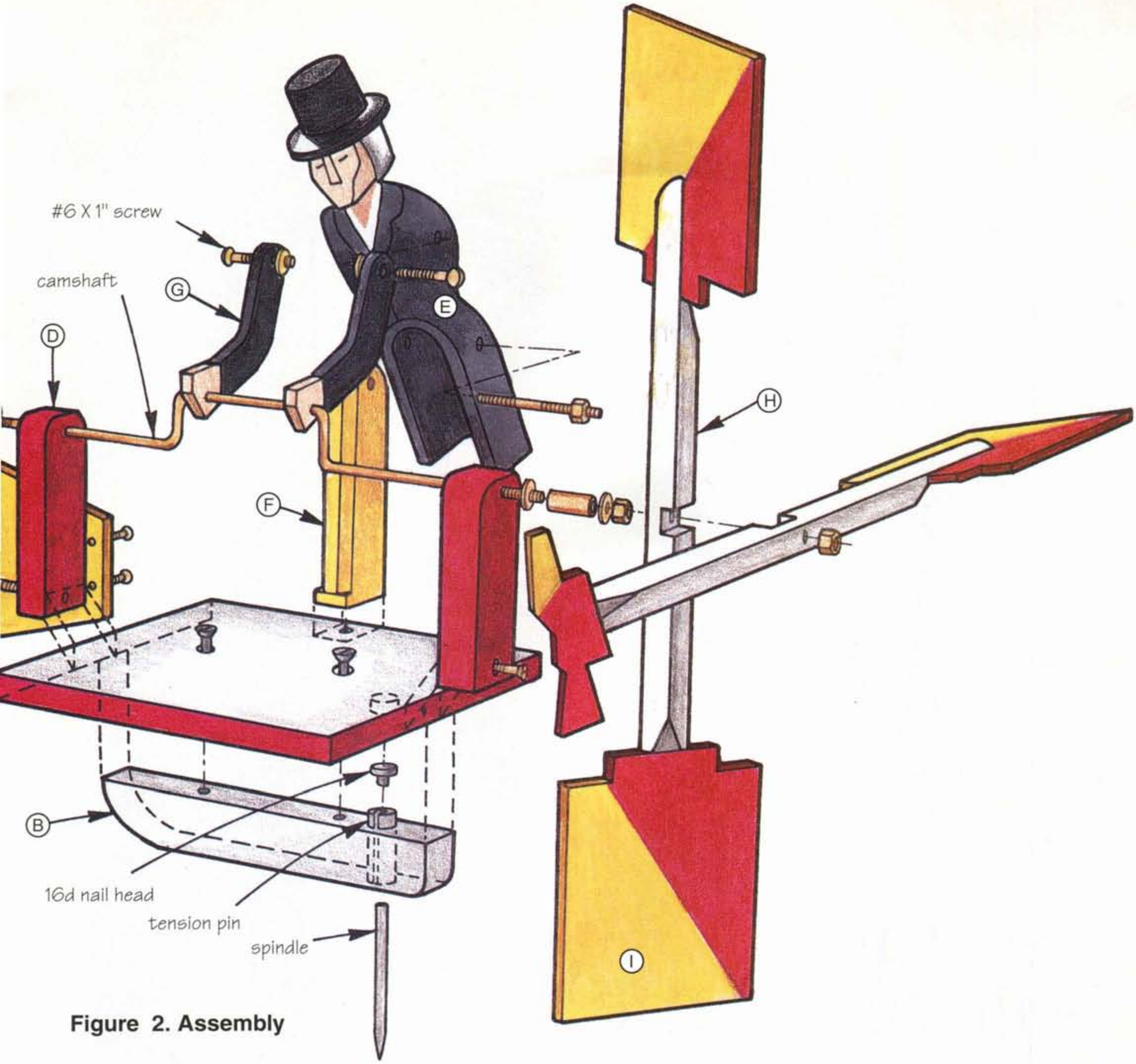


**Figure 2. Assembly**

the camshaft. Adjust the position of the sides with respect to the platform in order to achieve an easy rotation. When everything moves smoothly, mark the position of the side pieces and glue and screw them in place.

Drill the decorative ¾" and 1" holes through the rudder as shown in the PullOut™ Plans and mount it with glue and screws to the rear side piece.

The propeller arms are joined with a half–lap joint in the middle of each arm. For this joint, cut a 5⁄16" X 5⁄16" dado centered in each piece. Make 45° marks on the ends of the arms to note the proper direction of the blades. Measure in 2" from each end and cut the ⅛" wide slots for the blades. This can easily be done on the band saw using a V–block to support the arms. Glue and nail the blades to the arms; then, glue the two arms at the hub. Drill a 7⁄64" hole through the center of the hub (the lap joint) for the drive shaft. Cut a short length ⅛" ID tubing to prop the propeller assembly away from the side piece and mount the propeller assembly to the cam shaft using washers and #6–32 machine nuts as shown in Figure 2. This propeller will provide a steady action for the whirligig in a variety of breezes. If the prevailing wind is quite strong, make a propeller with longer arms (14" or 16").

Finally, drill a 7⁄32" hole in the center of the eccentric piece (J) *and screw it* into the back end of the camshaft. Painting the whirligig is limited only by your imagination. Some of the old ones were fancifully colored. The colors I used are: platform—white with red trim; side pieces—red; rudder—yellow; man—black suit and hat, yellow trousers; propeller blades—diagonally red and yellow; eccentric, black. The next time you make a whirligig of this antique design, try a different figure, a woman in a dress or an athlete. PW

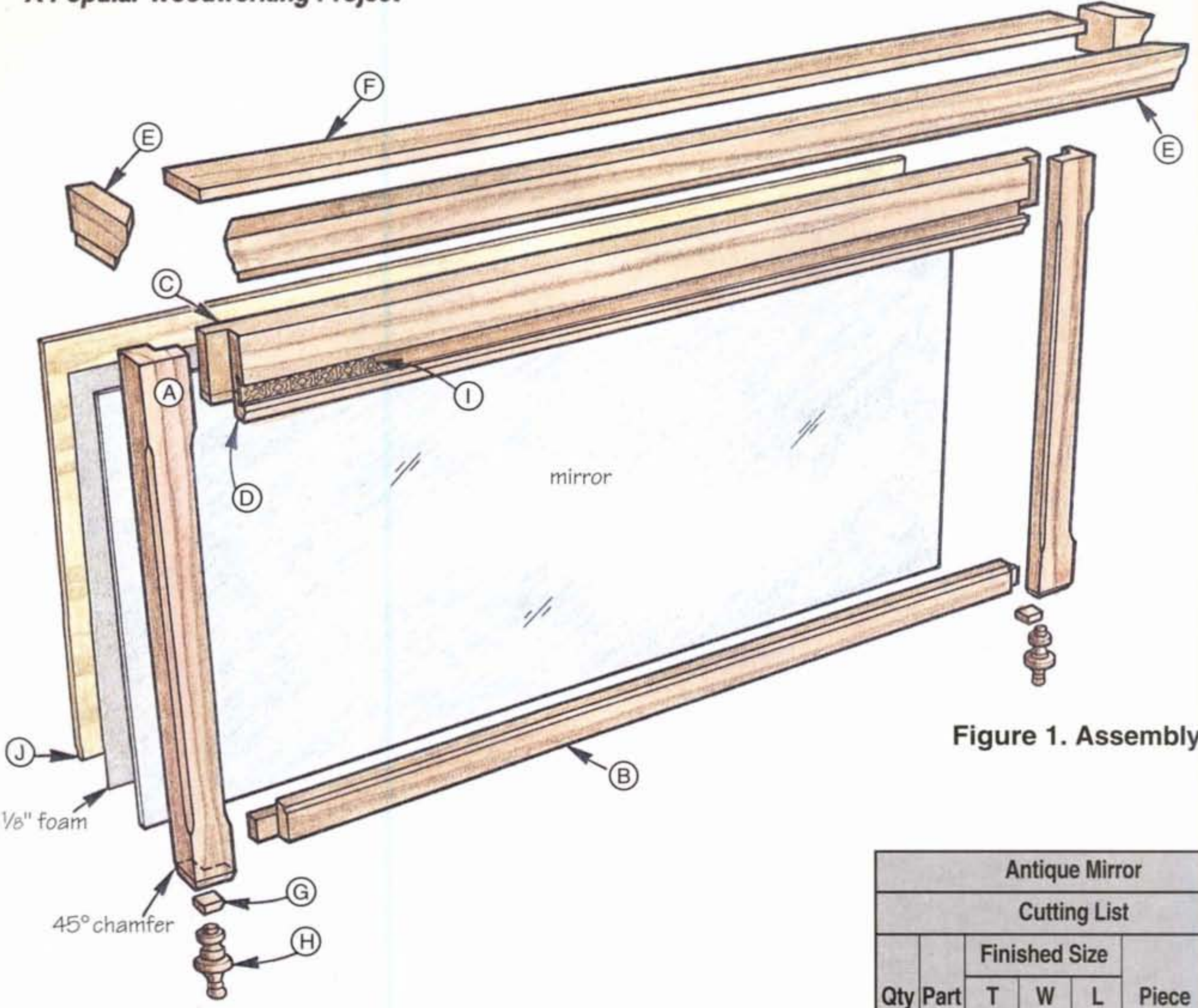


**Figure 1. Assembly**

# Antique Mirror Frame

**by W. J. Morrison**

Here's something that started out as a problem and wound up as a project. A friend was looking for a wall hanging to fill a 40" X 20" space, but couln't find anything appropriate. I suggested a *mirror sized* to fit his requirements. The wall space was in a cramped area and a mirror would add depth.

After discarding a variety of sketches that were too busy, too gaudy or too Victorian, I settled on the design here. Creating a design to fit existing decor is a subjective process. I produced a full–size front view drawing and hung it up in place. This simple test tells you immediately whether you've matched the design to the environment.

The height and width of the mirror can be adjusted to fit a variety of your requirements. The decorative treatments—mouldings and finials—can be modified to suit different tastes and styles.

## Mirror Frame Construction

The basic frame, is constructed from two stiles (A), a lower rail (B) and upper rail (C and D), and is assembled with glue and woodscrews. Crown moulding

---

***W.J. Morrison** insists that he only works in the shop because he was framed.*

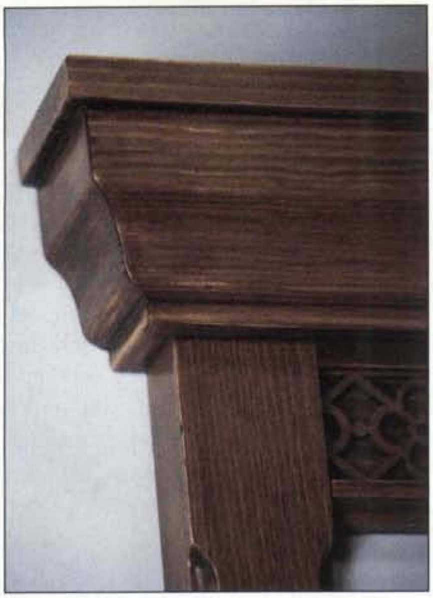
**Antique Mirror**

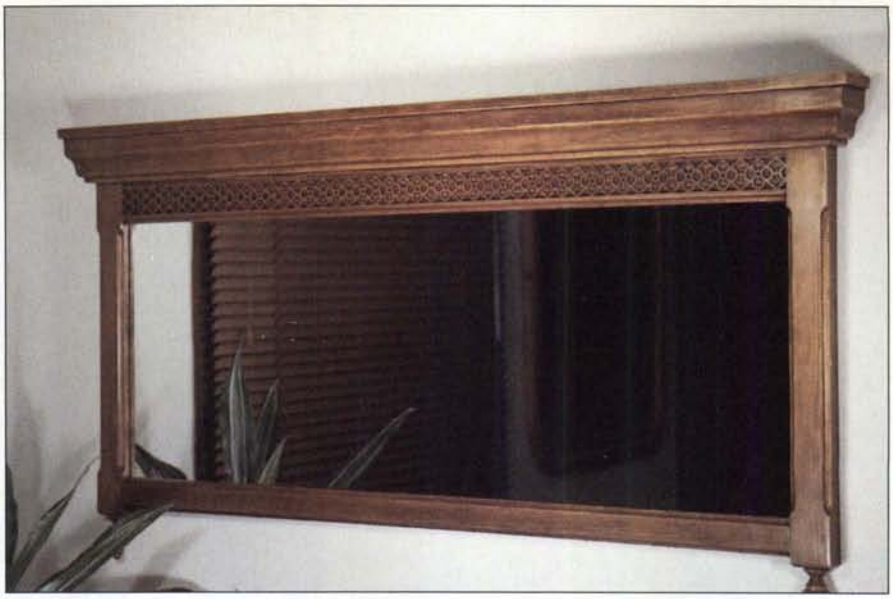
**Cutting List**

| | | Finished Size | | | |
|---|---|---|---|---|---|
| Qty | Part | T | W | L | Piece |
| 2 | A | 1⅛" | 1⅝" | 18⅝" | stiles |
| 1 | B | 1⅛" | 1½" | 36¼" | lower rail |
| 1 | C | 1⅛" | 3⅛" | 36¼" | upper rail top |
| 1 | D | 1⅛" | 1⅛" | 36¼" | upper rail bottom |
| 1 | E | 1⅛" | 2¼" | 48" | crown moulding |
| 1 | F | ½" | 2⁷⁄₁₆" | 40⅝" | top trim piece |
| 2 | G | ⅝" | ¾" | ⅜" | fillers |
| 2 | H | - | - | 2¼" | finials |
| 1 | I | ⅛" | 1½" | 36" | fretwork |
| 1 | J | ⅛" | 13⁷⁄₁₆" | 36⅛" | back panel |
| 4 | K | ⅜" | ⅜" | 12" | retainer strips |

**Supplies**

| | |
|---|---|
| 1 | ⅛" X 13⁷⁄₁₆" X 36⅛" mirror |
| 10 | #8 X 1" FH wood screws |
| 8 | #6 X ¾" PH sheet metal screws |
| 4 | ¾" X 4" L braces |
| 2 | heavy duty hangers |





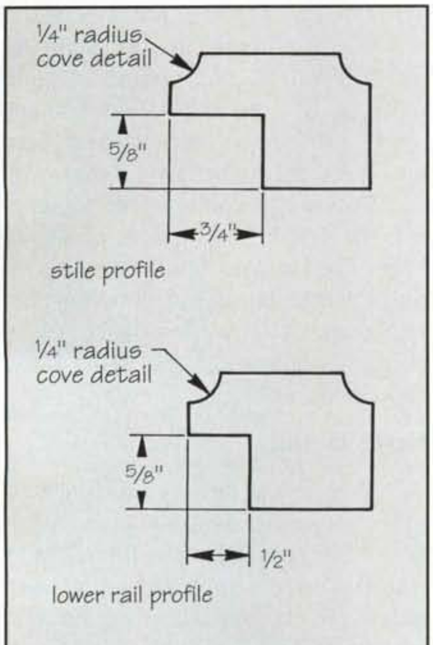


**Figure 2. Picture Rabbets**

(E) and a top trim (F) complete the project. You'll cut a series of rabbet joints to connect the pieces together.

Make the frame from 5/4 clear pine, which actually measures about 1 1/8" thick. Thickness may vary slightly from board to board, so check or cut all of the pieces from a single length of stock.

## Stiles

Begin by cutting the stiles (A) and the fillers (G) to the dimensions given in the Cutting List. Cut a rabbet in each stile as shown in Figure 2. Glue the fillers into the bottom of the rabbet (see Figure 3). When the glue is dry, sand the filler flush with the end. Locate and bore a 1/2" X 3/8" deep hole into the bottom center of each stile. Use a brad point bit to keep the drill aligned properly. These holes are for the tenons on the ends of the finials (H). If you bore deeper than the filler pieces, the bit will enter the rabbet on the back of the frame and may deflect, making the hole out–of–round. Trim the tenons on the finials to 3/8".

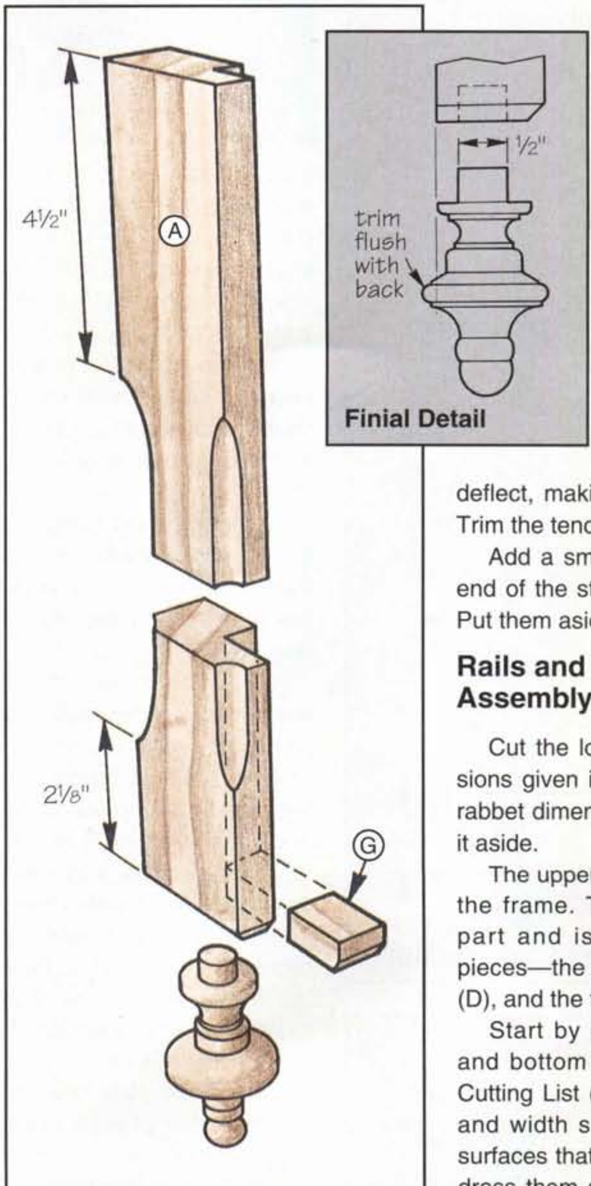


**Figure 3. Stile Subassembly**

Add a small chamfer on the bottom end of the stiles as shown in Figure 1. Put them aside for now.

## Rails and Horizontal Assembly

Cut the lower rail (B) to the dimensions given in the Cutting List. Cut the rabbet dimensioned in Figure 2 and put it aside.

The upper rail completes the parts of the frame. This is the most complex part and is assembled from three pieces—the upper rail top (C), bottom (D), and the fretwork grilling (I).

Start by cutting the upper rail top and bottom to the sizes given in the Cutting List (Figure 4a). Cut the length and width slightly oversize. Mark the surfaces that will be glued together and dress them smooth on the jointer. Add biscuit slots to the adjoining surfaces to make alignment easier during glue–up.

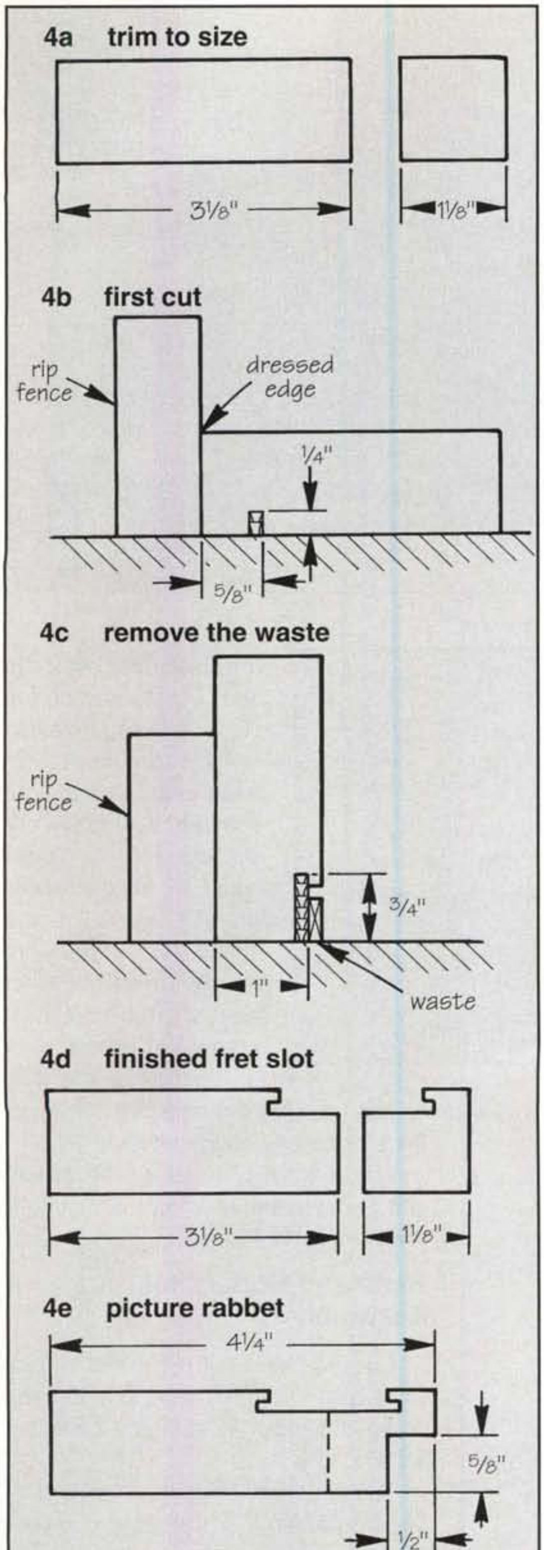


**Figure 4. Upper Rail Construction**

## Specialty Sources

Fretwork can be purchased from *Albert Constantine and Sons* 2050 Eastchester Rd., Bronx, NY 10461 (1-800-223-8087).

Finials can be purchased from *Cherry Tree Toys* P.O. Box 369, Belmont, OH (1-800-848-4363).

Next, cut a ⅛" X ¼" deep slot the full length of each piece (Figure 4b). Turn the stock face down with the dressed edge against the table saw's fence. Use a ⅛" wide blade to make the kerf. Locate the saw fence so the far edge of the blade is ⅝" from the dressed edge of the stock.

Locate the rip fence so the far edge of the blade is 1" from the fence and cut away the waste with a second cut (Figure 4c).

When both cuts have been made to the upper rail pieces, the finished profiles should look as shown in Figure 4d. Clamp the lower and upper horizontals together before glue-up, and make sure the fretwork slides freely into the recess. Recut the recesses if necessary. Glue the lower and upper rails together and sand smooth to remove any saw marks.

Cut the rabbet the full length of the piece's lower edge as shown here in Figure 4e. Cut the upper rail assembly to a length of 36¼". Then cut the rabbets on the ends of the lower rail and upper rail assembly as dimensioned in Figure 5.

Slide the fretwork into the front recess on the back piece. Orient it so the pattern is centered in the middle of the assembly. Mark the fretwork overhang and trim it to length by scoring it several times with a utility knife and then carefully snapping off the excess. Sand the edges smooth.

Dry–fit the rails and stiles face down on a flat surface. Make sure the pieces are perpendicular to one another. Clamp the parts down, and drill pilot holes 1" deep from the back of the frame using a screw drill set. Secure the frame pieces together with #8 X 1" FH wood screws, two in each lower corner and three in each upper corner. Screw the frame together without glue so you can disassemble it. Screw one corner at a time to make this task easier.

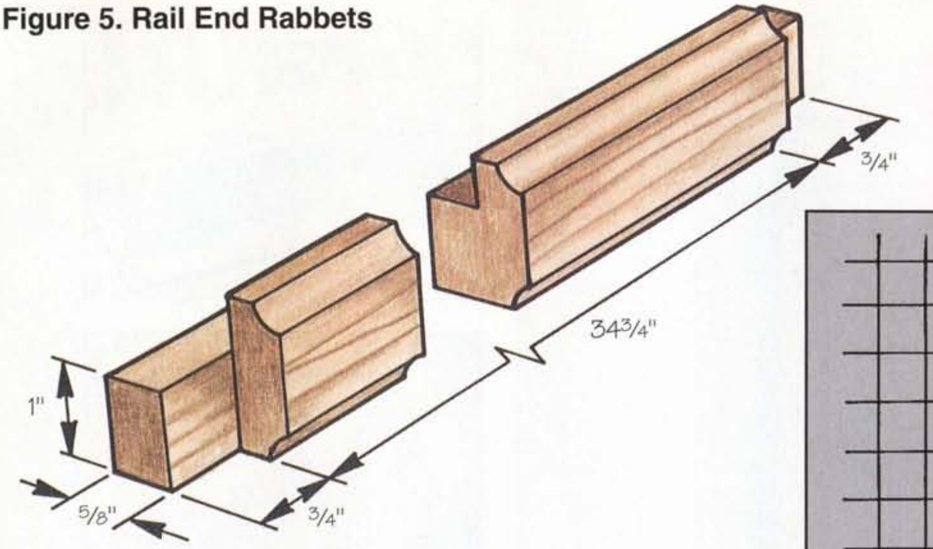
## Cove Details

Finish sand the front surface until all of the frame pieces are flush with one another. Disassemble the frame. Don't rout the cove details until the flush sanding is complete. If you sand after routing, the cove details will be blunt. Sanding ensures that the frame pieces are of uniform thickness.

Rout the cove details with a ¼" cove bit installed in a table-mounted router. Rout both front edges of the lower rail and the bottom front edge of the upper rail assembly their full length.

Next rout the cove details in both front edges of the stiles. Mark where the detailing is to start and stop on the pieces as dimensioned in Figure 3. Mark your router table to show the leading and trailing cutting edges of the cove bit. Match the lines on the stock with those on the table to locate the starting and stopping points for the cuts. Check your setup using a piece of scrapwood. Several passes over the bit reduces the possibility of chip–out.

**Figure 5. Rail End Rabbets**



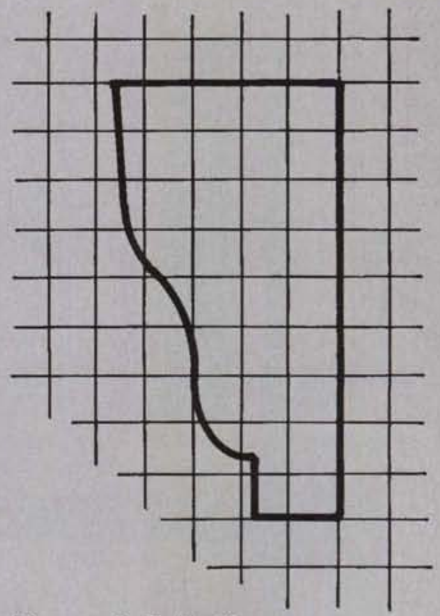


**Figure 6. Full–Size Moulding Profile**

## Assembling The Frame

If you plan to stain the frame, several things need to be done. Stain the fretwork and back–piece separately. Allow the stain to dry; then slide the fretwork into the recess. Don't use glue; the edges of the recess will hold it in place. The back assembly will then stain uniformly. Apply glue to the tongues and screw the pieces together. The screws eliminate the need for clamps, make sure the frame assembly is square before the glue sets.

## Top Pieces

Lay the frame on its back and install the top assembly with glue and nails. Next, cut a piece of 2¼" solid crown moulding (E) to fit below the top assembly. If solid crown moulding is difficult to obtain locally, make a substitute from a combination of smaller moulding pieces (Figure 6). Cut the moulding into three pieces, sizing their lengths to fit the front and sides of the mirror frame. Due to size variations, the lengths for these pieces have to be measured from the assembled frame—that's why no individual lengths are provided for these pieces in the Cutting List.

Cutting the miters on the short side pieces is difficult. Cut them longer than needed. Then match up the mitered end of each piece with the front, mark where the back end is located, and cut the piece with a fine–toothed hand saw and miter box. Install the moulding with glue and nails. Glue the finials into the holes in the bottoms of the stiles to complete assembly. Sand the finial balls flush on the back side so the finished mirror will sit flat against the wall.

## Final Finish

Fill any nail holes and defects then finish sand. Stain the project if desired and allow it to dry; then apply two coats of polyurethane. Allow a full day of drying time between coats. Wipe the frame with a tack cloth before applying the first coat. When dry, sand with 320-grit paper, with the grain, to smooth any air bubbles and remove any trapped dust. Vacuum all surfaces and rub the frame with a tack cloth again. After the second coat, use #0000 steel wool to rub the finish to a dull appearance. Rub only in the direction of the grain. Vacuum again and buff with a soft terry cloth until a fine luster appears.

## Mounting Details

Add flat steel L braces to the rear corners with FH wood screws. Corner braces provide extra assurance that the frame won't distort or weaken over time. Place these braces out of the way of the mirror recess.

Have the mirror plate cut to size at your local glass retailer as given in the Cutting List. Cut the back panel (J) to the dimensions given in the Cutting List from ⅛" thick hardboard or plywood. Both the mirror and back plate are ⅛" less than of the inside frame dimensions to allow for expansion and a slight variation from square.

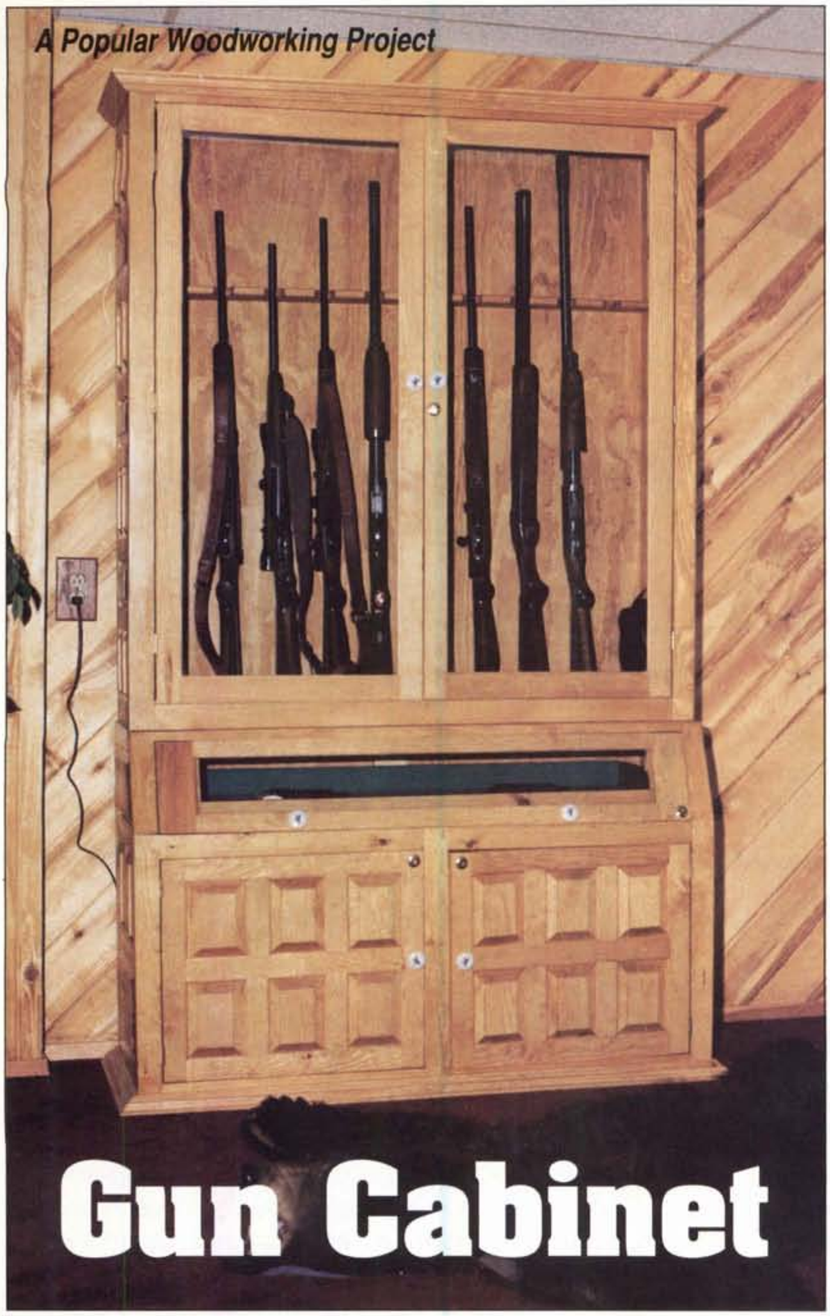
Next, drill pilot holes for the #6 X ½" FH screws for the back–panel retainer clips. Locate the holes 5⁄32" in from the sides. Secure one at the center of each stile and three on each rail—space them out evenly.

Lay the frame face down on a protective surface. Brush the recess free of debris that might damage the mirror and set it in place. Lay a piece of thin foam packing (about 1⁄16" to ⅛" thick), or corrugated cardboard, on the back of the mirror as a protective cushion. This prevents the back panel from scratching the mirror coating.

Secure the back panel in the frame with retaining strips (K) using #6 X ¾" panhead sheet metal screws. When mounted properly, the strips don't protrude beyond the rear of the mirror frame.

Now mount the mirror and enjoy. It's fairly heavy, so use strong hangers mounted to the rear of the frame in conjunction with heavy wall anchors. PW

*A Popular Woodworking Project*



# Gun Cabinet

**by Hugh F. Williamson**

Why not get it all together, your rifles, shotguns, pistols, ammunition and other essential gear, all in one place? Not only can you get it all together, but you can show off your collection while keeping everything safely under lock and key.

This gun cabinet is made in two units for ease of construction and ease of handling (you will have to move the cabinet from the shop to the den when it's completed). I chose pine for its rugged Western look.

The upper half of the cabinet holds rifles and shotguns. The base has a pull out display shelf for pistols and four deep drawers for ammunition, cleaning supplies, and other accessories.

Two methods of panel construction are offered to suit your tastes. The first, which is shown in the photographs, is the raised panel method. This is definitely the more elegant of the two and the most complicated to construct. The panels can be cut with a raised panel router bit or on the table saw. The stiles and rails are cut on a table-mounted router or shaper using a matched

*Hugh F. Williamson, a retired physician, is a woodworker in Tucson, Arizona.*

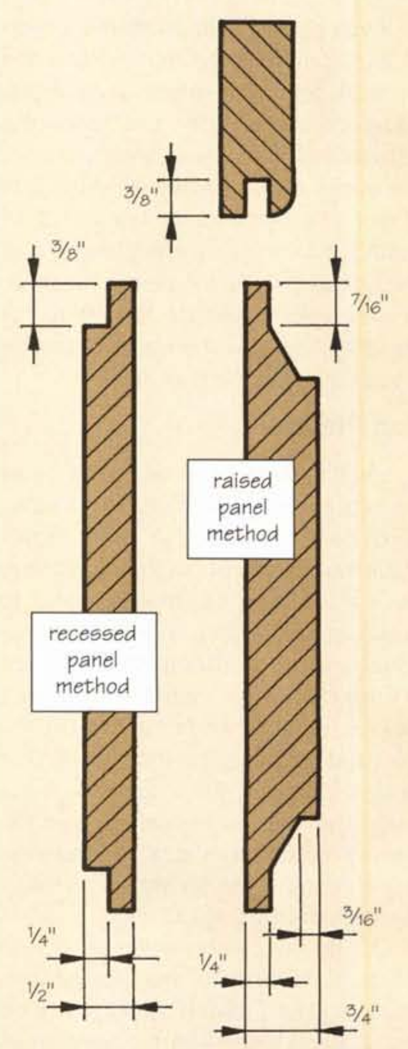


**Figure 1.
Panel Cross-Sections**

## Lower Gun Cabinet Cutting List

| Qty | Part | Finished Size T | W | L | Piece |
|---|---|---|---|---|---|
| 2 | A | ¾" | 2" | 30" | rear stiles |
| 2 | B | ¾" | 1¼" | 22" | lower front stiles |
| 2 | C | ¾" | 1½" | *9" | upper front stiles |
| 2 | D | ¾" | 2" | 8½" | mullions |
| 2 | E | ¾" | 2" | *13½" | top rails |
| 4 | F | ¾" | 2" | 14¾" | middle rails |
| 2 | G | ¾" | 3½" | 14¾" | bottom rails |
| 2 | H | ¾" | 6⅝" | *14⅝" | panels |
| 4 | I | ¾" | 6⅝" | 8⅜" | panels |
| 2 | J | ¾" | 7⅜" | 14⅝" | panels |
| 1 | K | ¾" | 11¾" | 47¼" | top |
| 1 | L | ¾" | *2½" | 48" | top front edge |
| 1 | M | ¾" | 17¼" | 47¼" | bottom |
| 1 | N | ¾" | 16⅞" | 46½" | upper shelf |
| 1 | O | ¾" | 15⅞" | 46½" | lower shelf |
| 1 | P | ¾" | ¾" | 46½" | lower shelf facing strip |
| 12 | Q | ½" | 2" | 16⅞" | shelf supports/spacers |
| 1 | R | ¾" | 3" | 28½" | back support |
| 1 | S | ¾" | *1" | 44" | face frame top rail |
| 2 | T | ¾" | 2" | *8" | face frame top stiles |

*trim to fit/special cut

## Lower Gun Cabinet Cutting List

| Qty | Part | Finished Size T | W | L | Piece |
|---|---|---|---|---|---|
| 3 | U | ¾" | 2" | 22" | face frame lower stiles |
| 4 | V | ¾" | 2" | 21" | face frame lower rails |
| 4 | W | ¾" | 8¾" | 16⅞" | top drawer supports |
| 4 | X | ¾" | 11" | 16⅞" | bottom drawer supports |
| 4 | Y | ¾" | 7" | 19¾" | drawer fronts |
| 8 | Z | ¾" | 7" | 16" | drawer sides |
| 4 | AA | ½" | 6¼" | 19" | drawer backs |
| 4 | AB | ¼" | 15¼" | 19" | drawer bottoms |
| 1 | AC | ¾" | 2" | 43" | pistol tray front |
| 2 | AD | ¾" | 3" | 15" | pistol tray sides |
| 1 | AE | ½" | 3" | 42¼" | pistol tray back |
| 1 | AF | ½" | 14¼" | 42¼" | pistol tray bottom |
| 2 | AG | ¾" | 3" | 7¾" | pistol door stiles |
| 2 | AH | ¾" | *1¾" | 38" | pistol door rails |
| 1 | AI | ⅜" | 29¼" | 47¼" | back |
| 4 | AJ | ¾" | 2" | 18" | door stiles |
| 8 | AK | ¾" | 2" | 6¾" | door mullions |
| 6 | AL | ¾" | 2" | 17¾" | door rails |
| 12 | AM | ¾" | 4⅞" | 6⅝" | door panels |
| 1 | AN | 1½" | 1½" | *96" | moulding trim |

*trim to fit/special cut

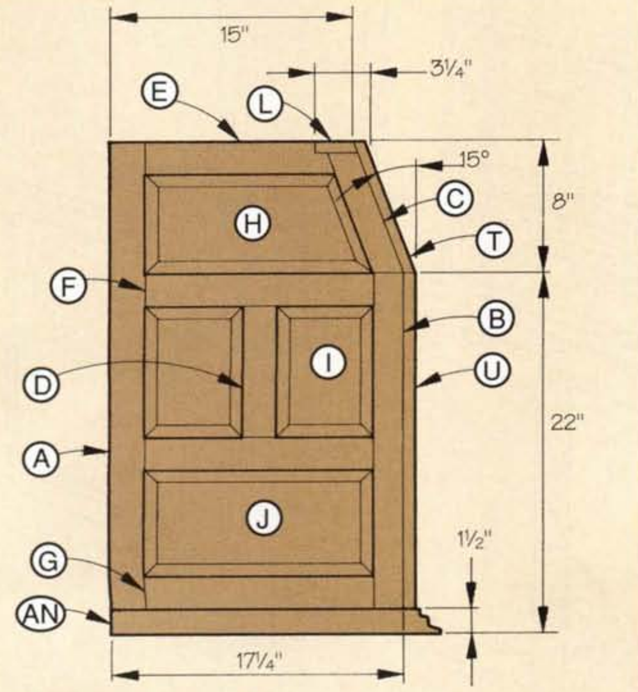
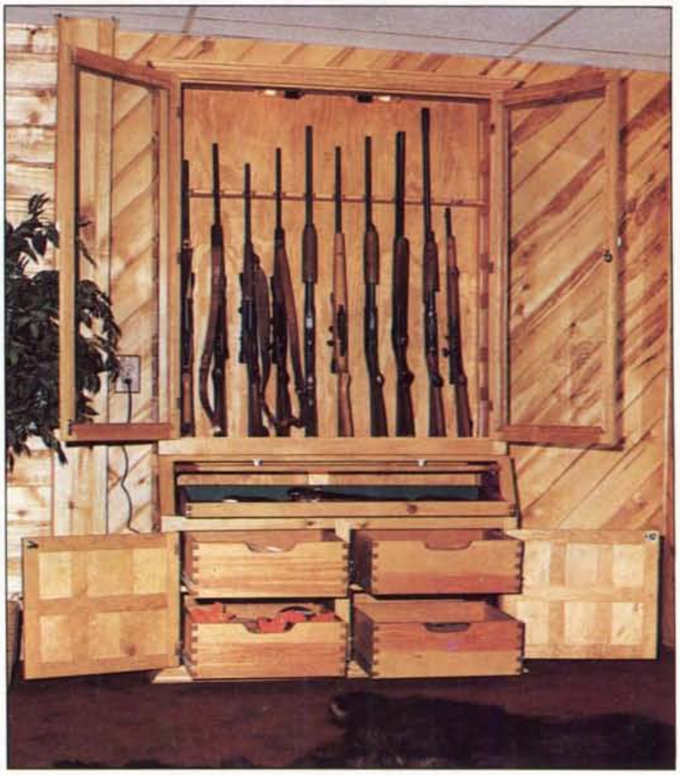


Figure 2. Lower Cabinet Side

illustrations by Tom Larson and Ginny Pruitt



***To minimize wood movement, stain and seal all the panels before assembly.***

***Dado the underside of the lower top (K) before assembly to receive the door slides.***

***Before gluing the face frame together, tack the pieces to the cabinet to check the fit.***

set of cope and pattern cutters (see the right–hand panel cross–section in Figure 1). The second method of construction is easier because it uses recessed panels and a lot fewer of them. The sidebar on page 71 outlines this approach.

## The Lower Cabinet

Cut all of the parts for the two sides of the lower cabinet (stiles A, B and C, mullion D, rails E, F and G, and panels H, I and J). Cut the cope and pattern in the rails, stiles, and mullions. Make a dry assembly (**Figure** 2) to check the fit on all the parts. *[Editor's note: Due to possible variations in cope and pattern router bits, your side and door assemblies may not come out the same size indicated here. The dimensions given are for a 3/8" depth of cut. The panels allow for a 5/16" set with 1/16" play.]* The panels are free–floating to prevent cracking with changes in humidity. I like to stain and seal the panels before assembly; it's easier and reduces the chance for moisture absorption. If you want to fix the panels in position while still allowing for some movement, place a small dab of silicone caulk on center at the top and bottom of each panel. Use glue only on the frame members.

Perform the assembly and glue up on a large flat surface, such as a sheet of 3/4" plywood supported on sawhorses. Secure

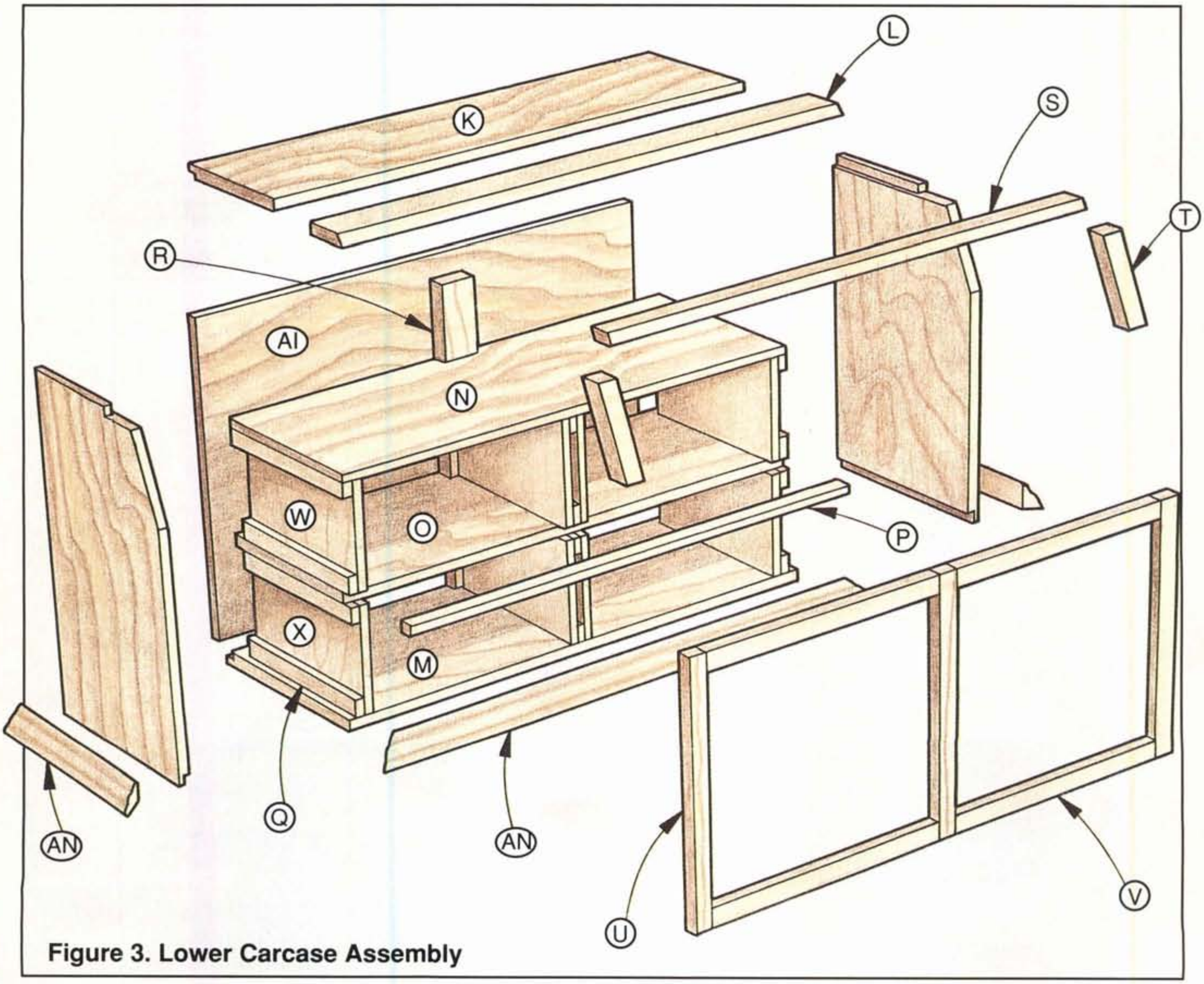
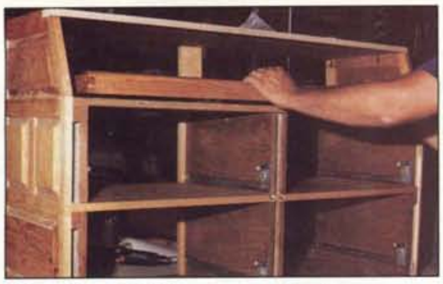


**Figure 3. Lower Carcase Assembly**



***The wide pistol drawer requires four mono-rail drawer glides to support its weight.***

***The mono-rail tracks attach to the under surface of the pistol drawer.***

***I located the pistol compartment lock in the lower right-hand corner. It latches against the door frame.***

***A router-mounted trim bit is a slick way to smooth your cabinet edges.***

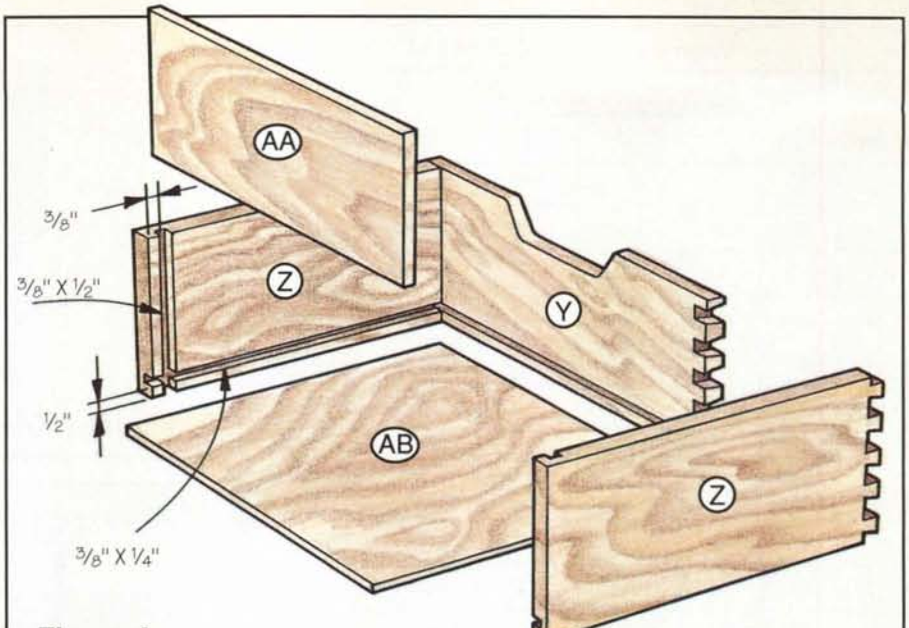


**Figure 4.**
**Basic Drawer Assembly**

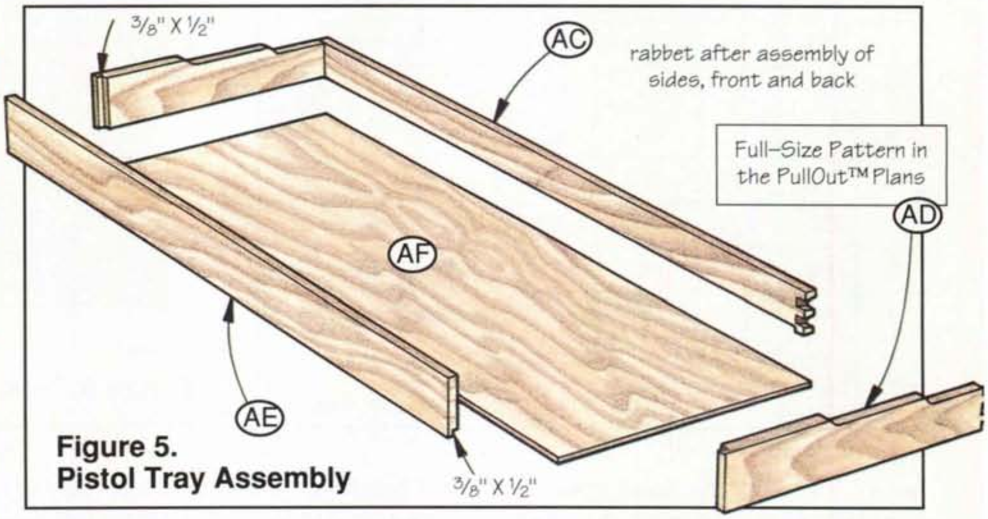

3/8" X 1/2"
AC
rabbet after assembly of sides, front and back
Full-Size Pattern in the PullOut™ Plans
AD
AF
AE
3/8" X 1/2"

**Figure 5.**
**Pistol Tray Assembly**

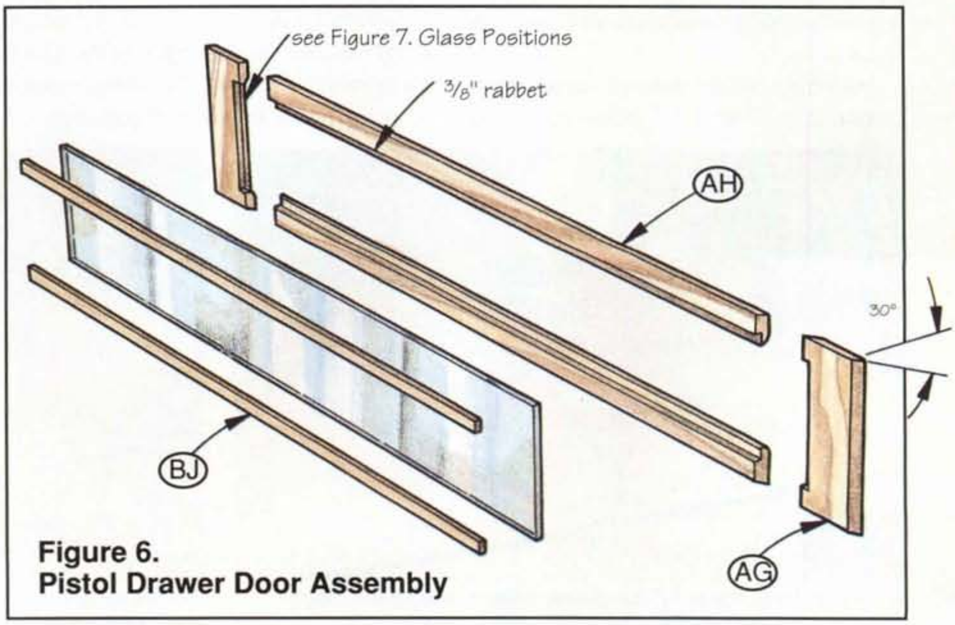


**Figure 6.**
**Pistol Drawer Door Assembly**

| Upper Gun Cabinet Cutting List | | | | | |
|---|---|---|---|---|---|
| | | Finished Size | | | |
| Qty | Part | T | W | L | Piece |
| 2 | AO | ¾" | 2" | 52" | rear side stiles |
| 2 | AP | ¾" | 1¼" | 52" | front side stiles |
| 8 | AQ | ¾" | 2" | 6¾" | mullions |
| 2 | AR | ¾" | 3½" | 9¾" | top side rails |
| 12 | AS | ¾" | 2" | 9¾" | side rails |
| 2 | AT | ¾" | 2" | 9¾" | bottom side rails |
| 16 | AU | ¾" | 4⅛" | 6⅝" | panels |
| 6 | AV | ¾" | 4⅛" | 9⅝" | panels |
| 1 | AW | ¾" | 12¼" | 47¼" | top |
| 1 | AX | ¾" | 12¼" | 47¼" | bottom |
| 1 | AY | ⅜" | 47¼" | 51¼" | back |
| 2 | AZ | ¾" | 2" | 52" | face frame stiles |
| 1 | BA | ¾" | 3½" | 44" | face frame top rail |
| 1 | BB | ¾" | 2" | 44" | face frame bottom rail |
| 4 | BC | ¾" | 2¼" | 46½" | door stiles |
| 4 | BD | ¾" | 2¼" | 17½" | door rails |
| 2 | BE | ½" | 2" | 46½" | door stops |
| 1 | BF | 1½" | 1½" | *54" | front trim moulding |
| 2 | BG | 1½" | 1½" | *15" | side trim moulding |
| 1 | BH | ¾" | 7¼" | 46¼" | stock rest |
| 1 | BI | ¾" | 3½" | 46¼" | barrel rest |
| 2 | BJ | ¼" | ¾" | 32¾" | glass retainer strips |

*trim to fit/special cut

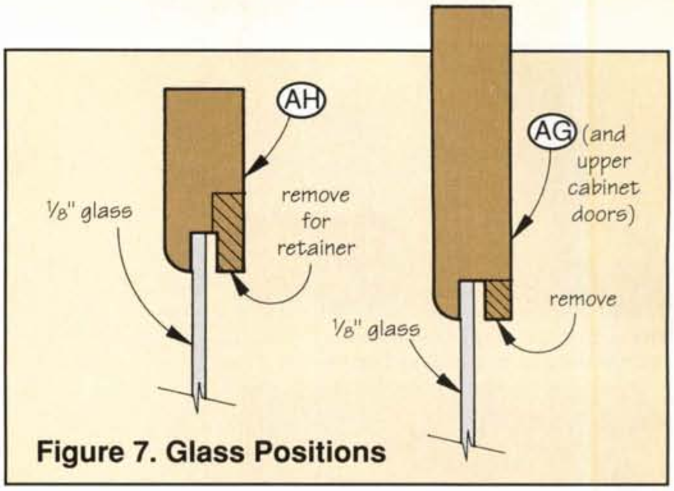


**Figure 7. Glass Positions**

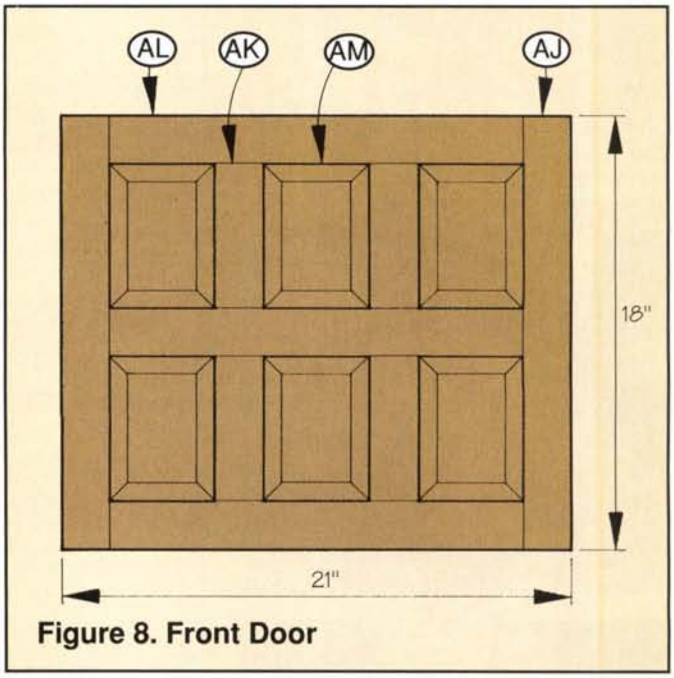


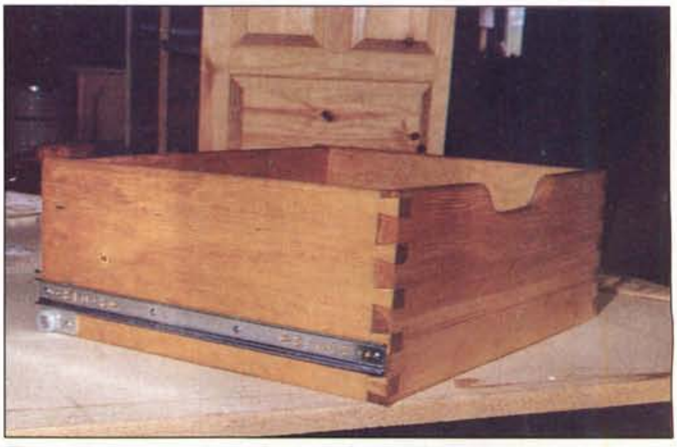
**Figure 8. Front Door**

two ¾" X 3" X 36" pieces of scrap to the plywood to form a fixed right angle to work against as you glue and clamp the panels together.

When these side assemblies are completed, rout a $^3/_8$" X $^3/_4$" rabbet at the top and bottom of the side panels to receive the top (K and L) and the bottom (M) as shown in Figure 3. Cut a $^3/_8$" X $^3/_8$" rabbet along the back inside edges of the sides, the top and the bottom. The under surface of the top needs two ¼" X 2" dadoes cut in before final assembly to receive the track for the Retrac–Dor slides (see the source list on page 70. If you're going to use a different make of retracting or flipper hinge, follow the manufacturer's instructions.

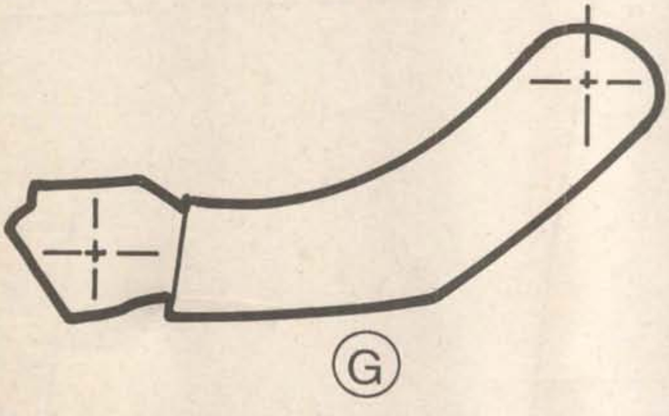
Glue and clamp the top and bottom in

*A pattern template of ¼" hardboard makes routing the hinge mortises for the cabinet doors quick and accurate.*

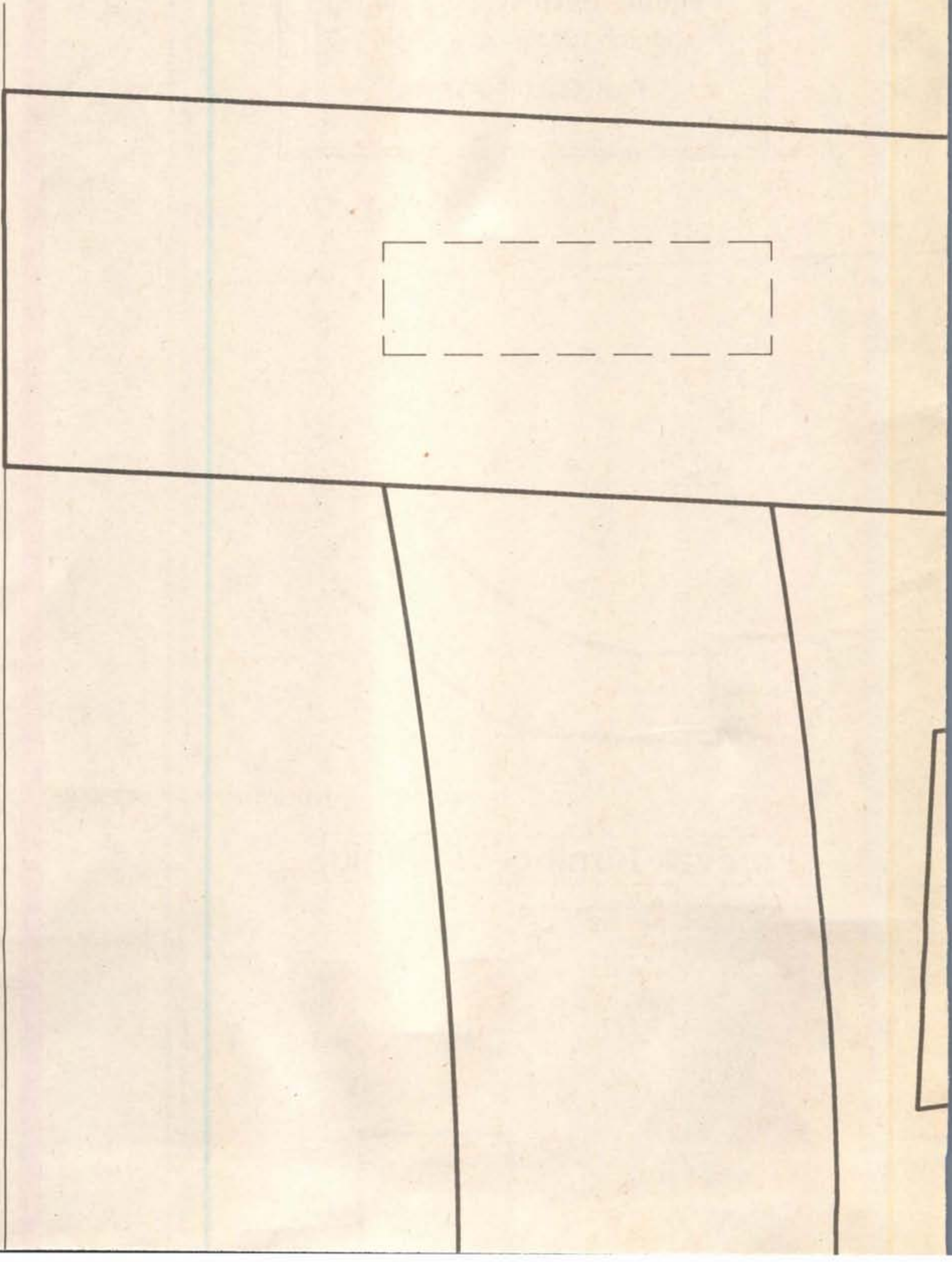


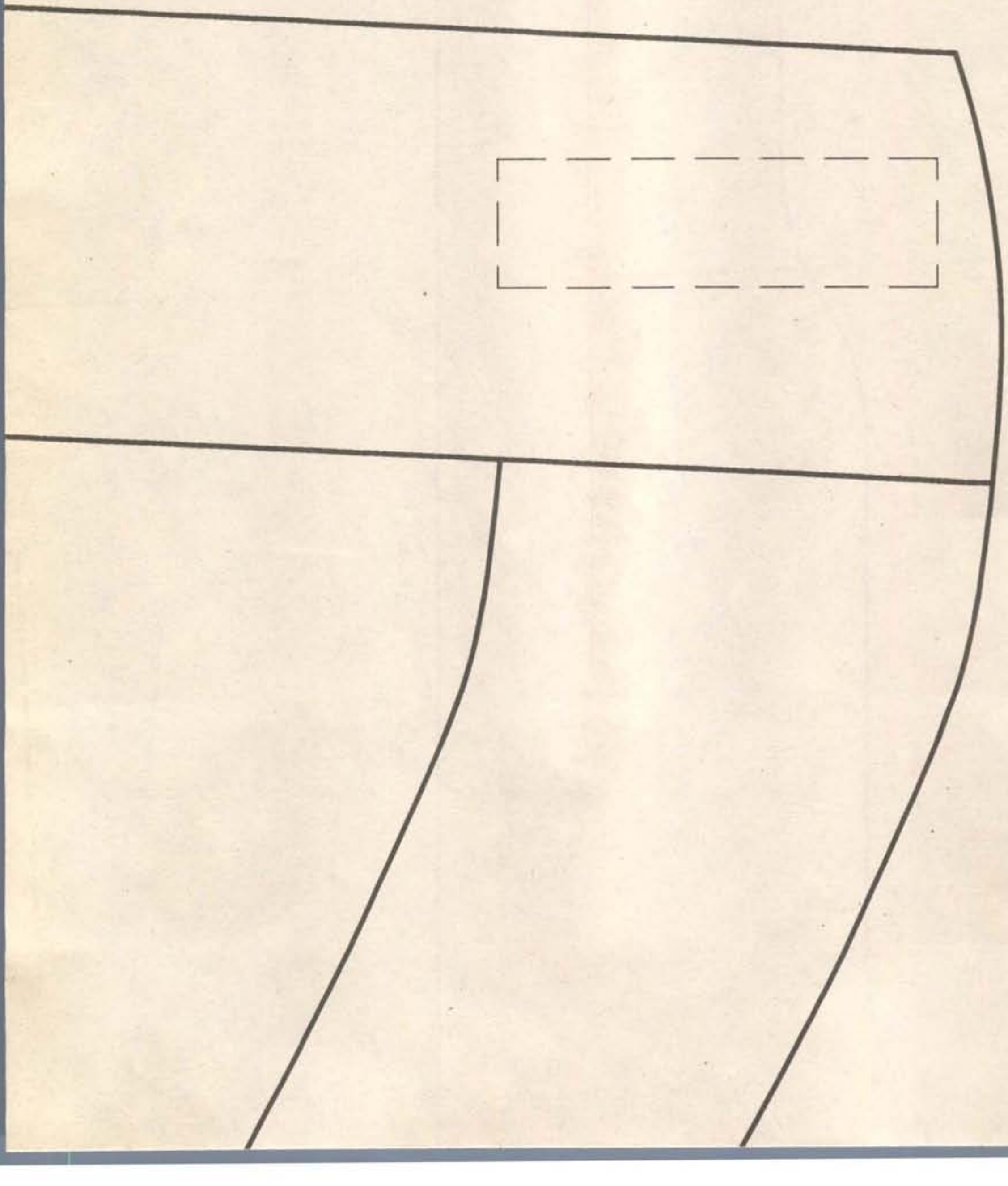
*The utility drawers have through dovetail corners at the front, and are equipped with heavy–duty drawer glides.*

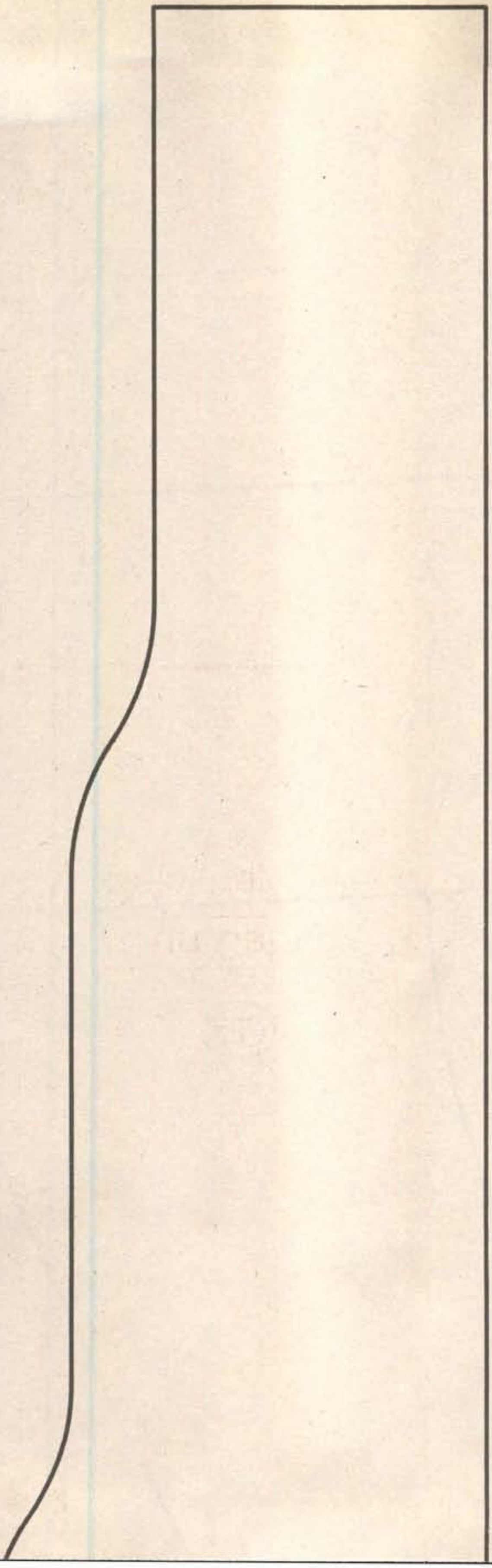
**Popular Woodworking No. 71**
March 1993 (pages 43-58)
**PullOut™ Plans**

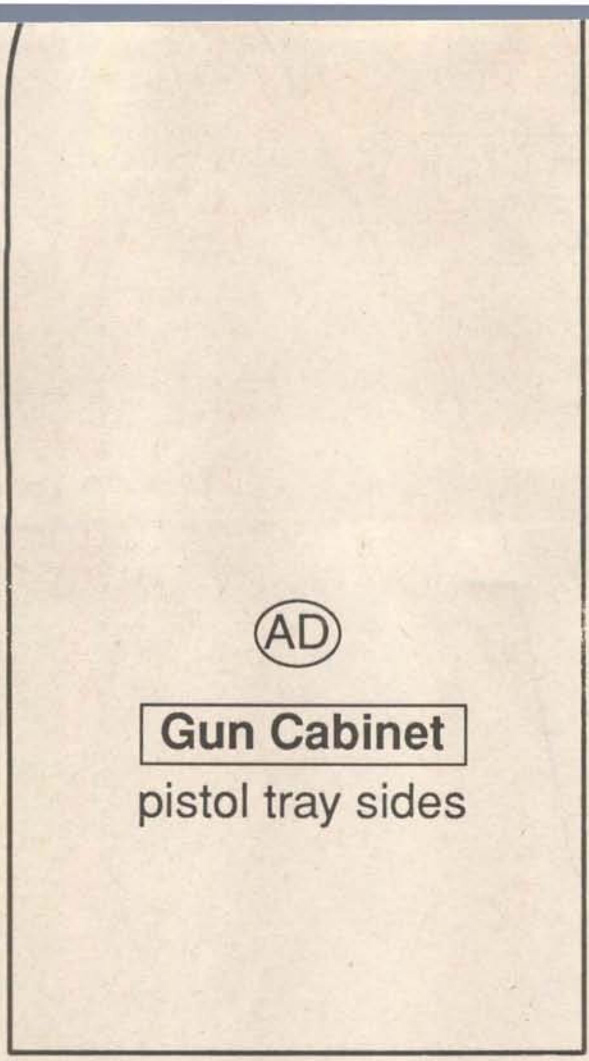


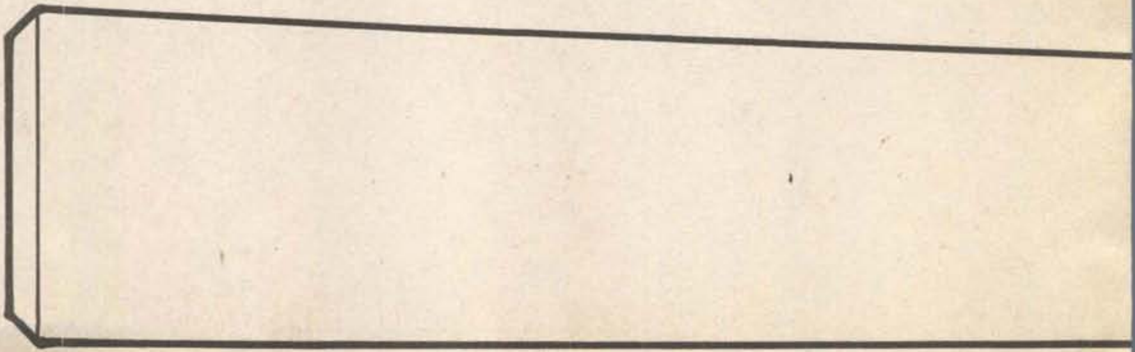
**Forever Turning–Whirligig**
arms

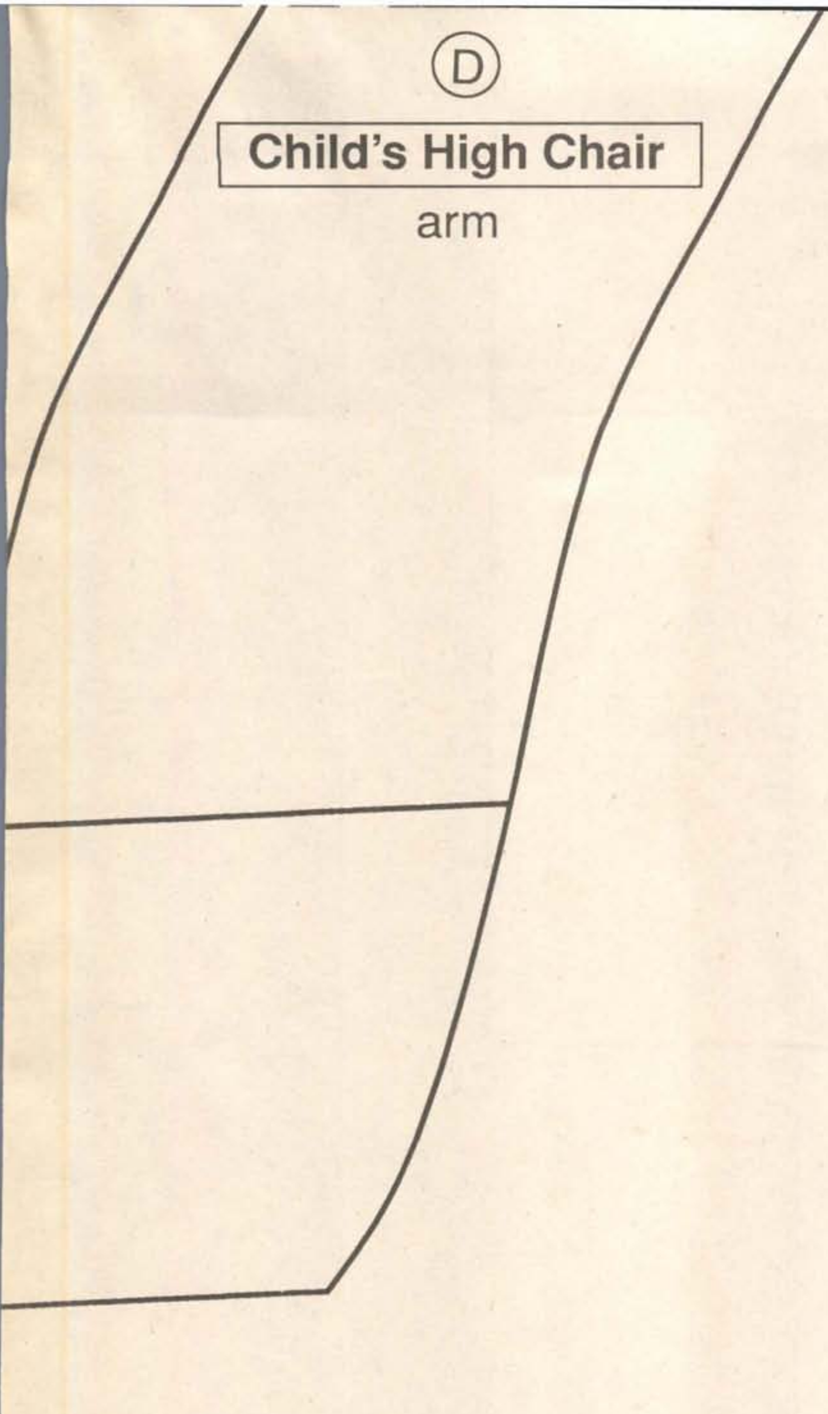


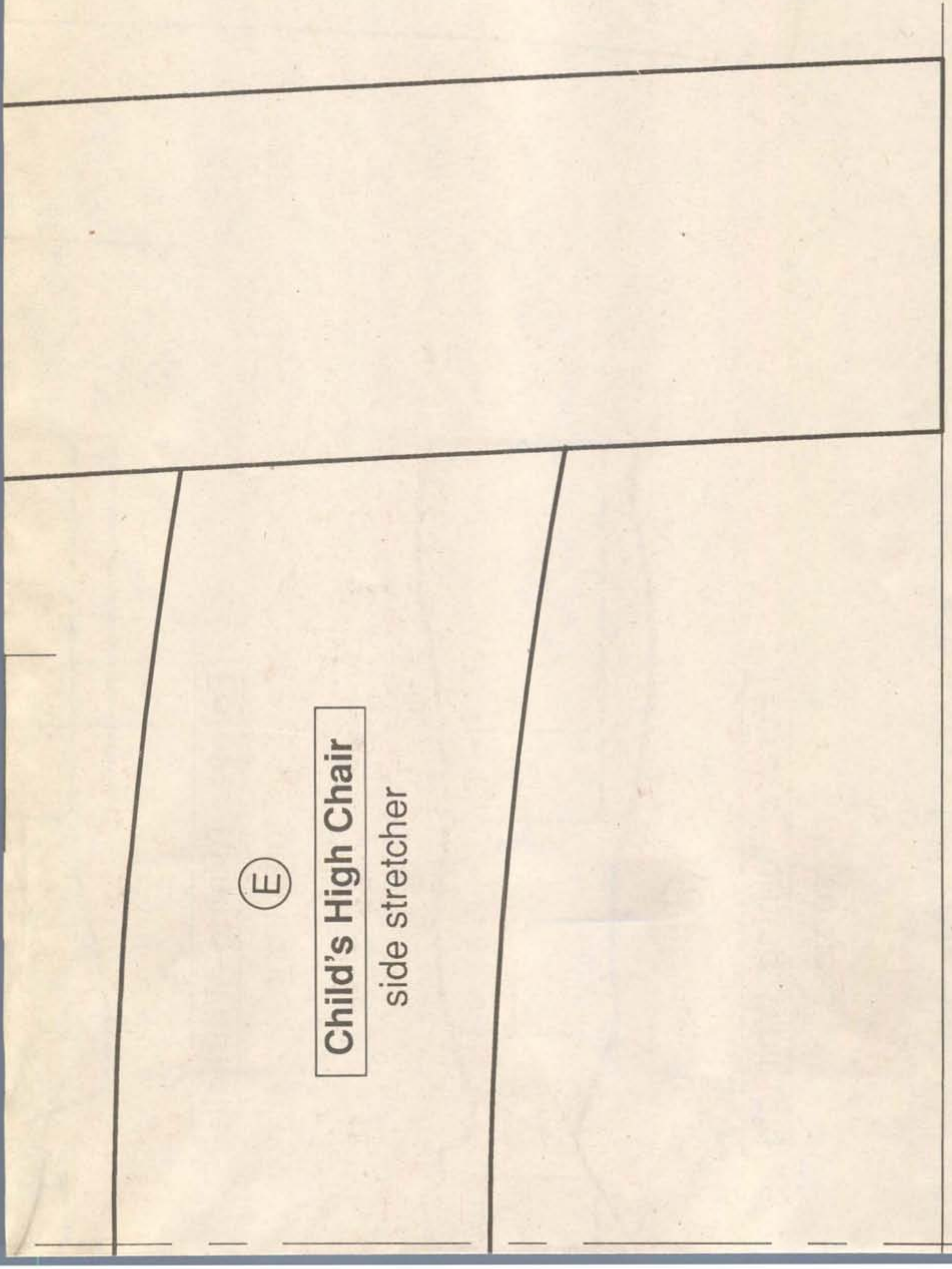


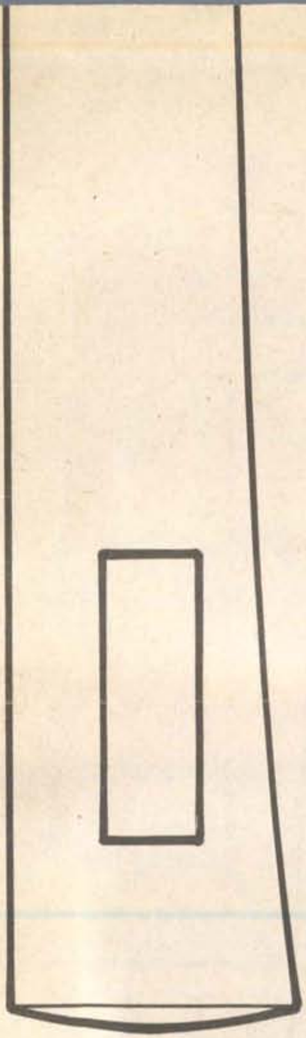


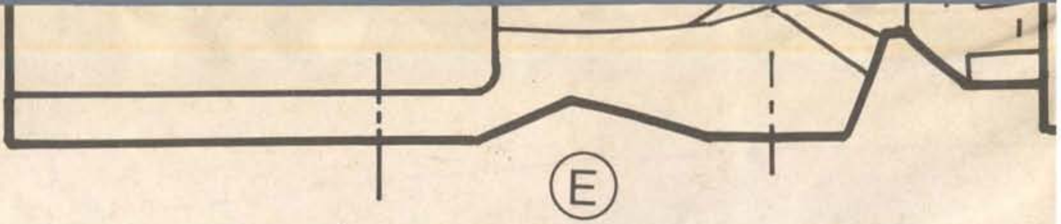

AD
Gun Cabinet
pistol tray sides




Ⓓ
Child's High Chair
arm


Ⓔ
Child's High Chair
side stretcher

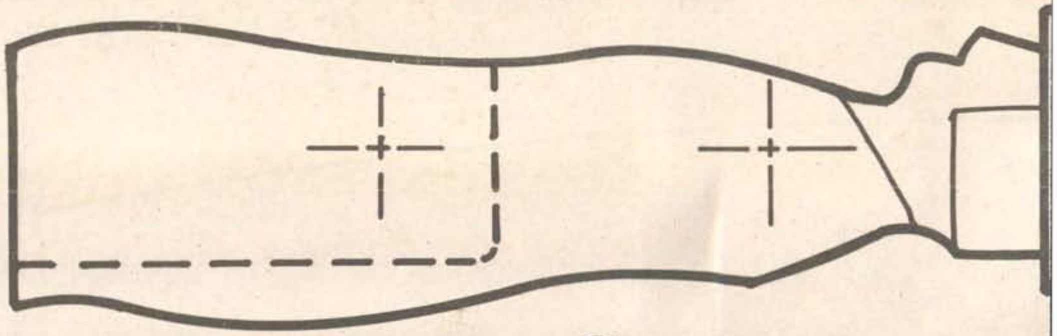




Ⓔ

**Forever Turning–Whirligig**

torso front



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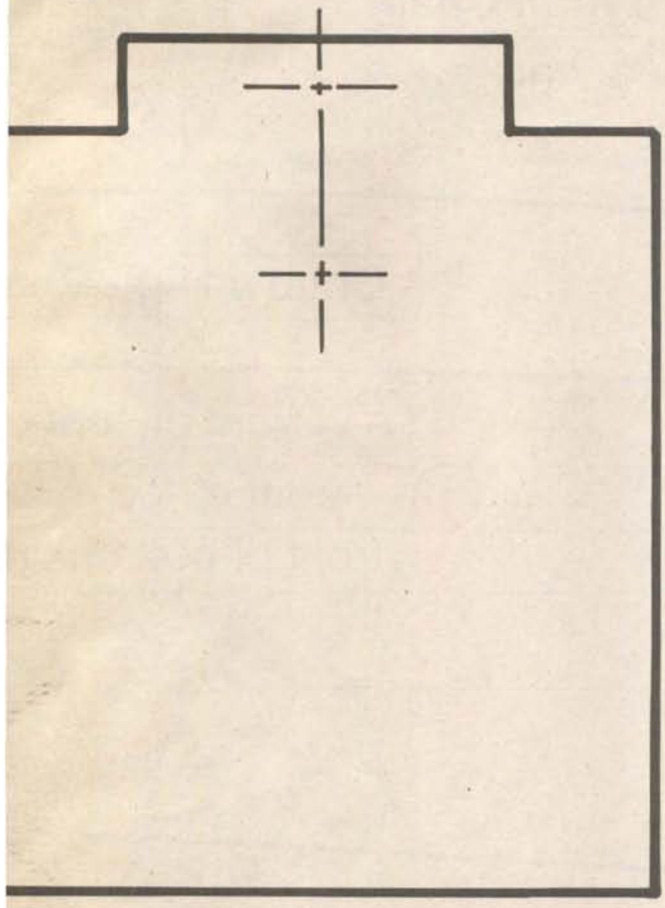
**Forever Turning–Whirligig**

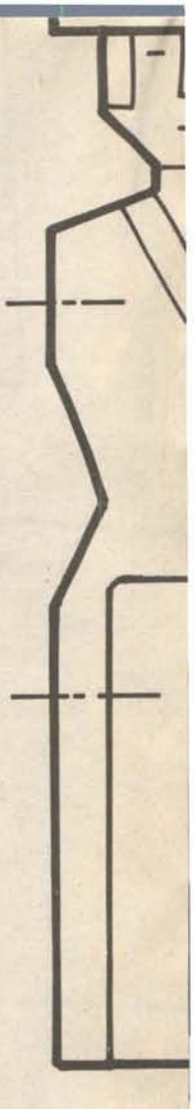
torso sides



Ⓘ

**Forever Turning–Whirligig**

prop blades

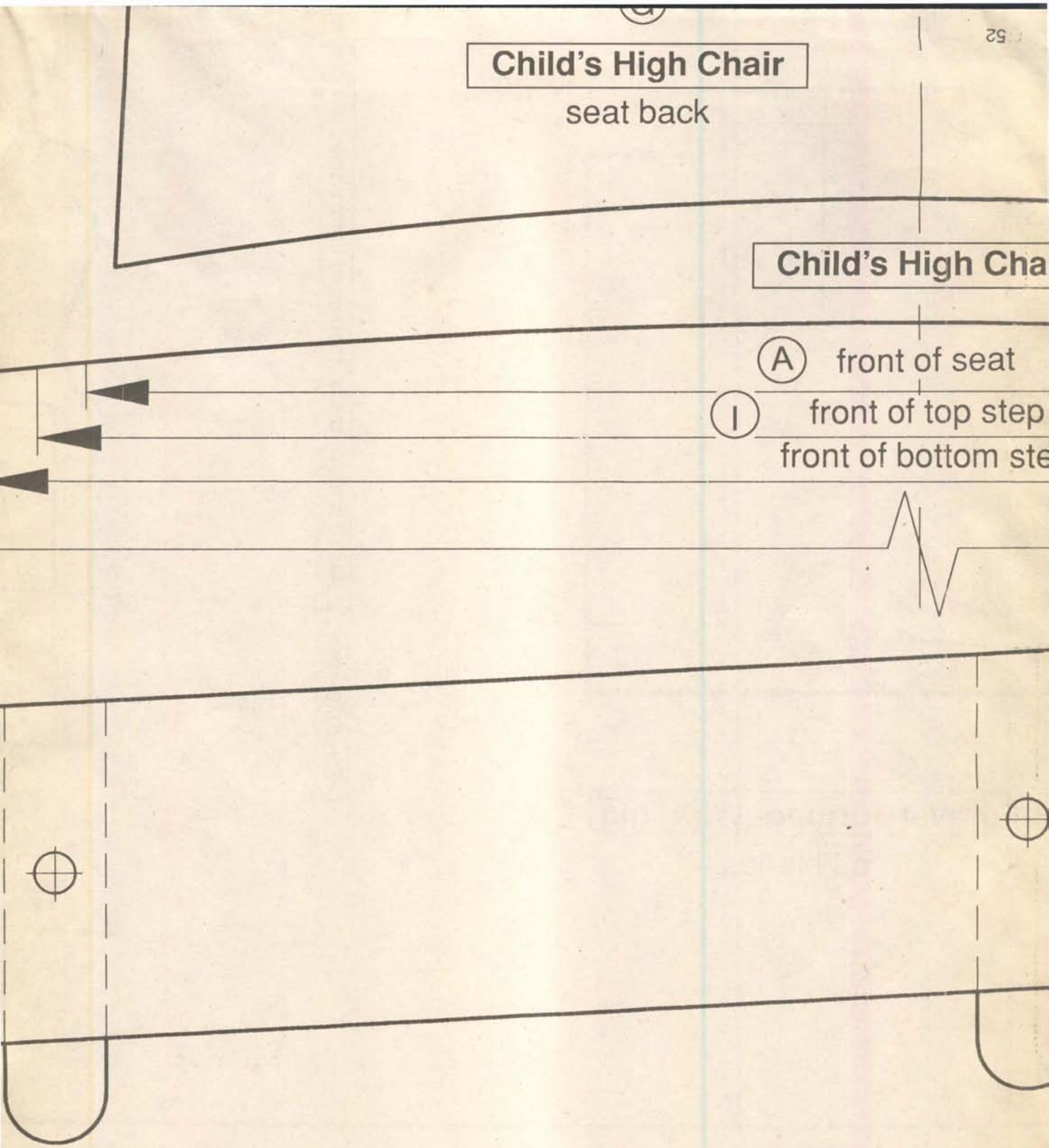


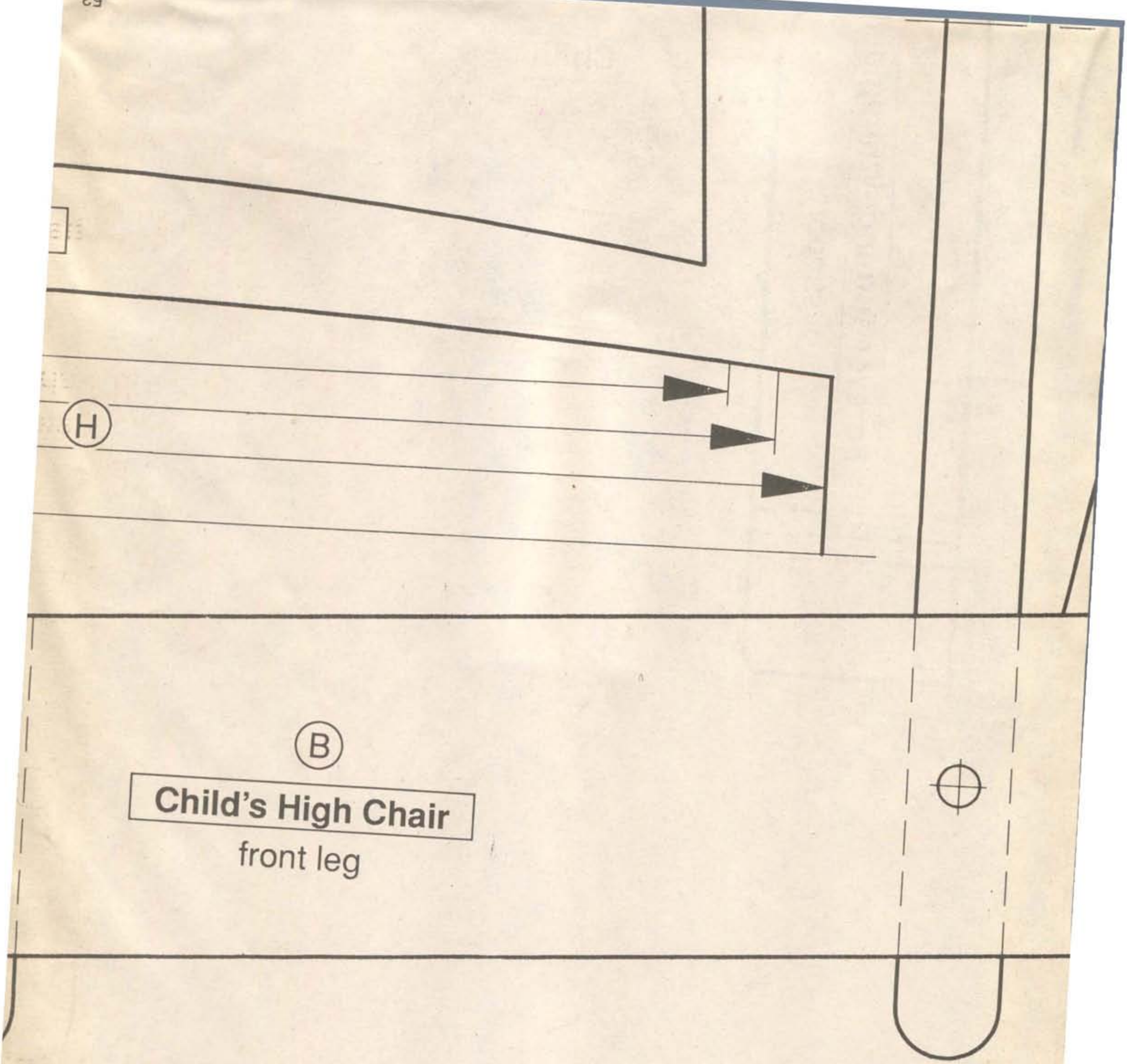
Carefully open staples to remove plans, then bend them closed again.

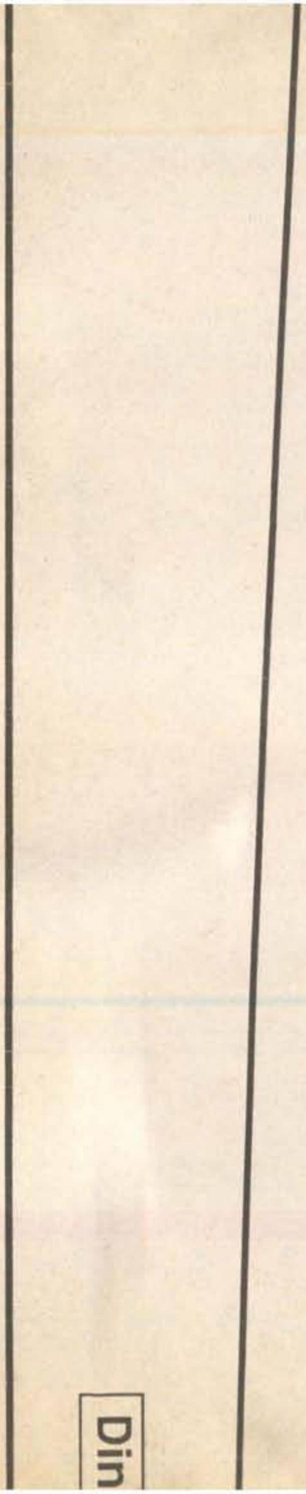
Ⓒ

**g Table**

eg


52
Child's High Chair
seat back
Child's High Cha
(A) front of seat
(I) front of top step
front of bottom ste


H
B
Child's High Chair
front leg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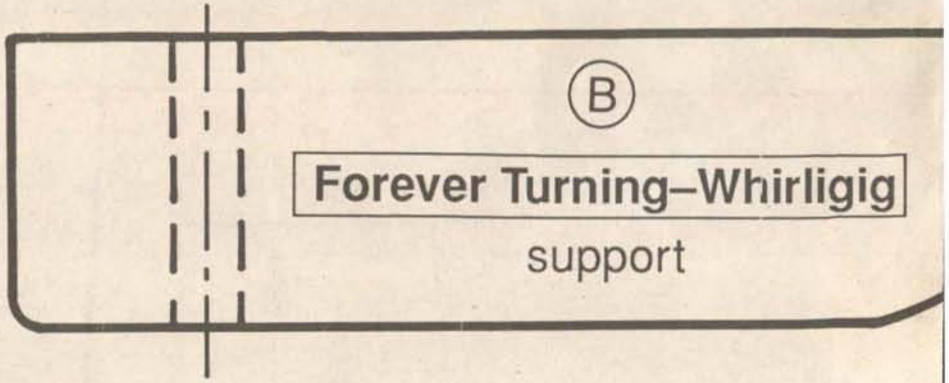
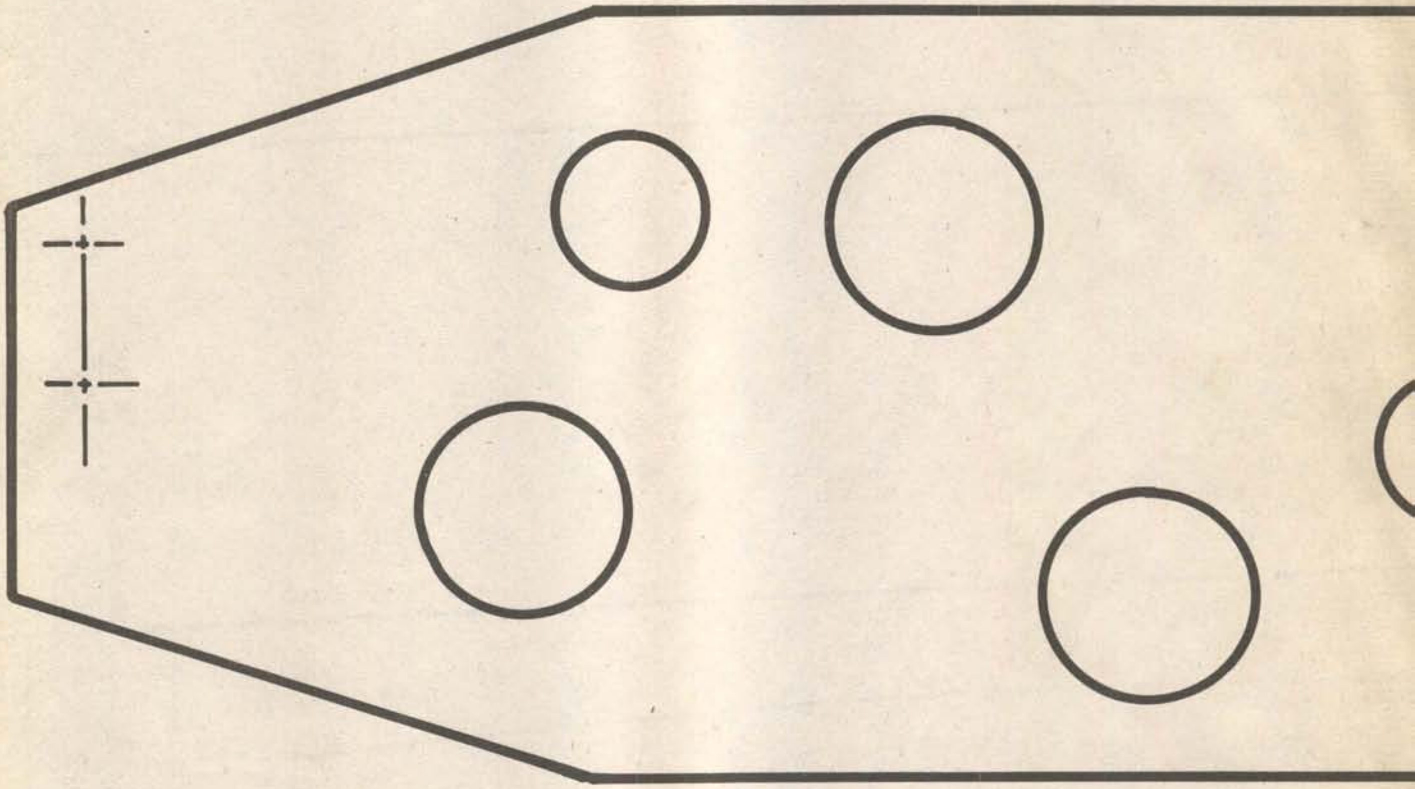
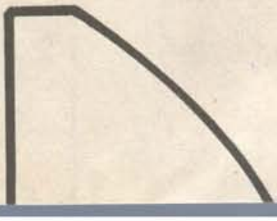

Ⓑ
Forever Turning–Whirligig
support

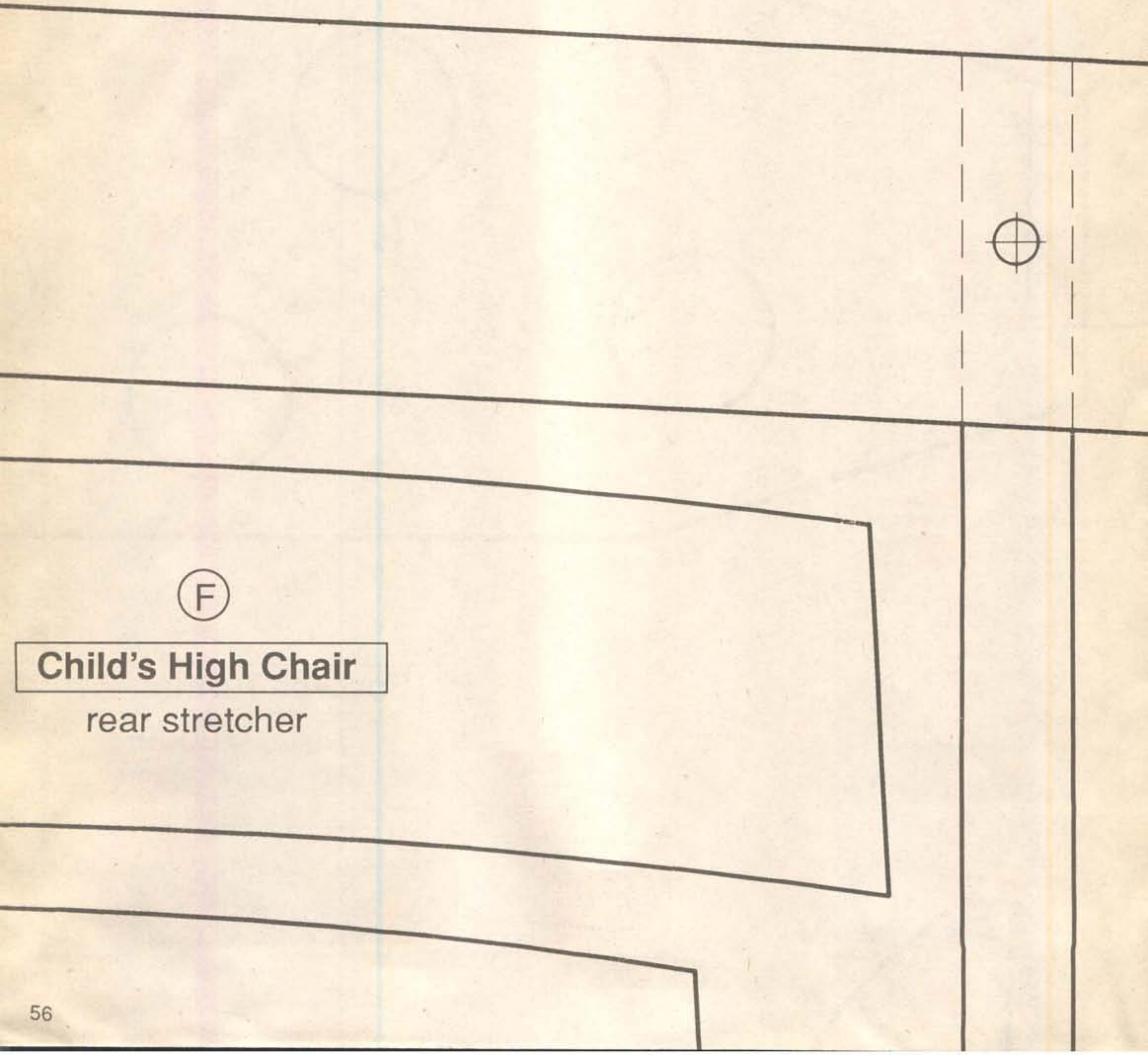


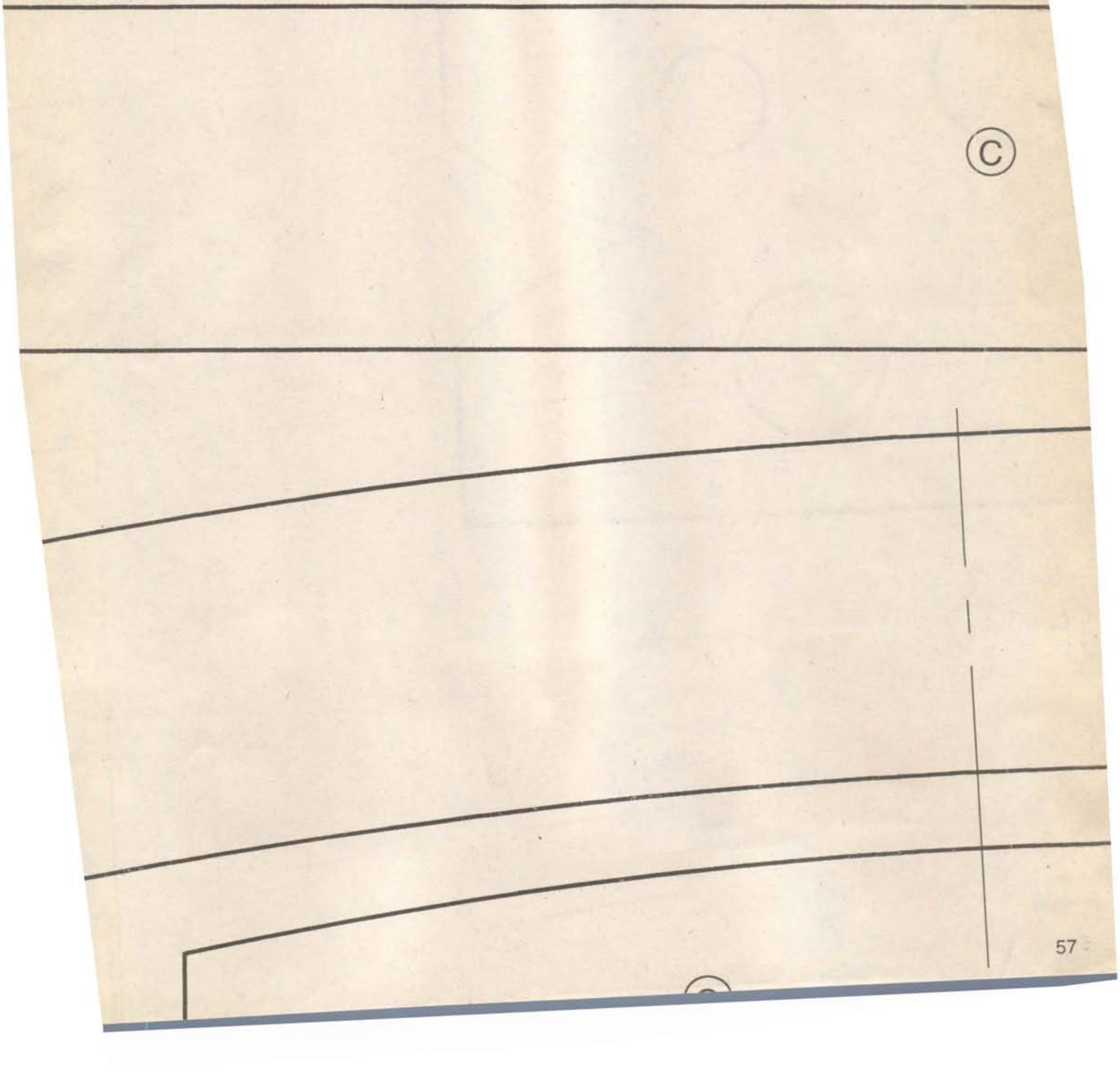
Ⓒ

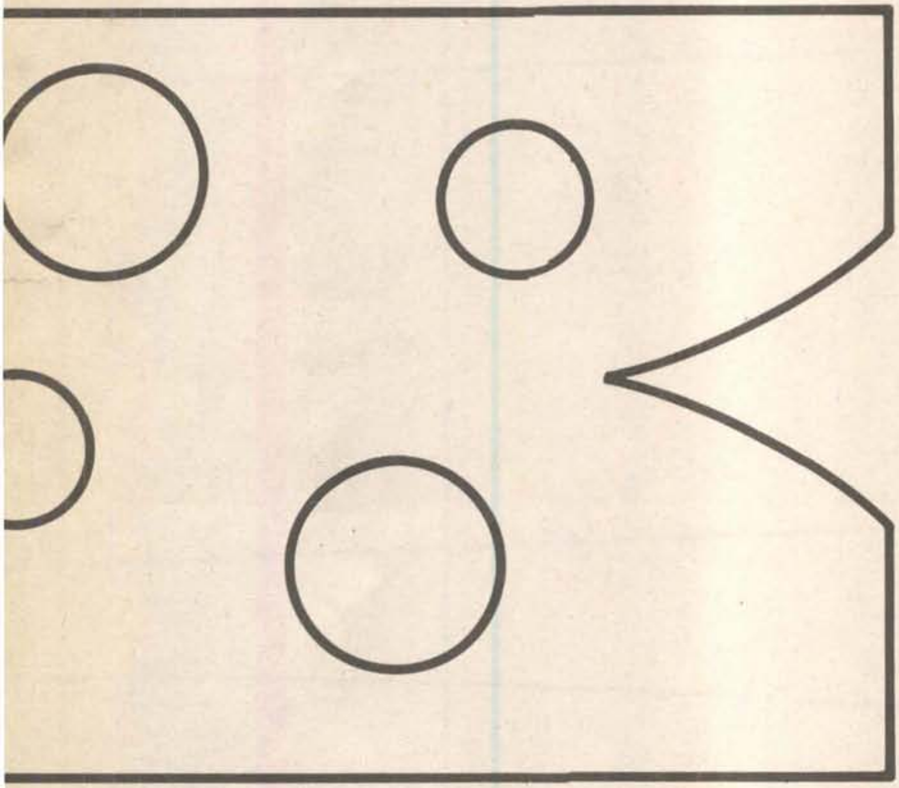
**Forever Turning–Whirli**

rudder




Ⓕ
Child's High Chair
rear stretcher


C



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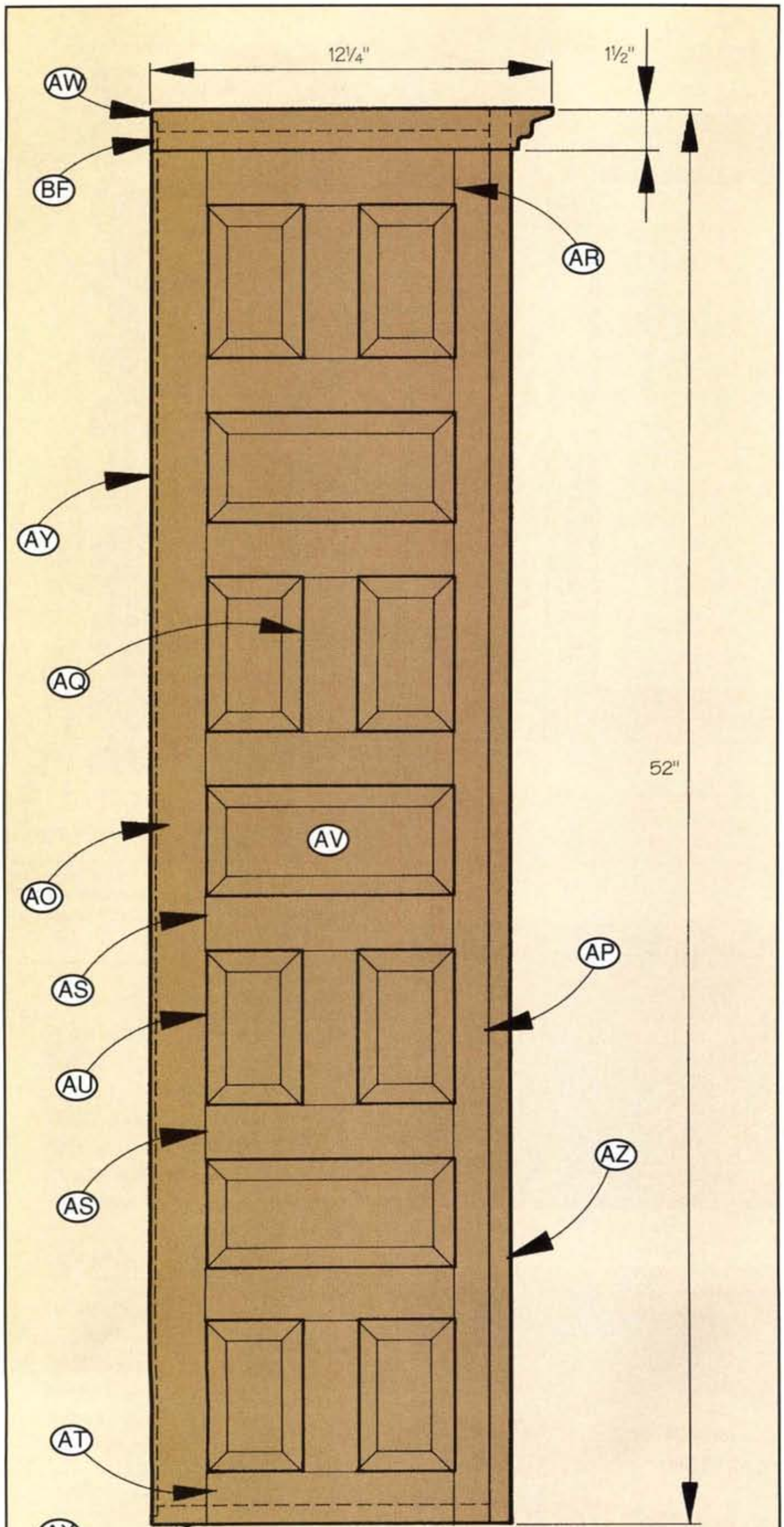


Figure 9. Upper Cabinet Side Panels

place, and check for square. While the glue is drying, attach the shelf supports (Q), the upper shelf (N) and lower shelf (O and P) flush with the rabbet for the back, and the back support (R). The back edge of the shelves must be notched ¾" X 3" to accommodate the back support and the lower shelf needs the facing strip (P) glued and nailed. Screw the shelf supports to the stiles, and glue and screw the shelves to the shelf supports. Cut and tack the front face frame (S, T, U and V) temporarily in place (photo page 66, right) before installing the drawer supports.

Cut the drawer supports (W and X) from plywood. Place them into position, mark their exact location, remove the face frame pieces, and install with glue and finish nails. These supports (photo page 67, top) are needed to give the proper clearance between the drawers, face frame and the open doors. Include ½" spacer strips between the side panel and the drawer supports and between the two center pieces. When you've finished, go ahead and install the sliding hardware. Note that the bottom drawer glides must be positioned so that the drawers will clear the bottom face frame rails (V).

The four equipment drawers (Figure 4) have through dovetails cut on the two front corners. Rabbet or other drawer front joints would also be okay; adjust the dimensions as necessary. Because of the weight of

*(continued on page* **58** *)*

***The lower cabinet door locks can be located in any position.***

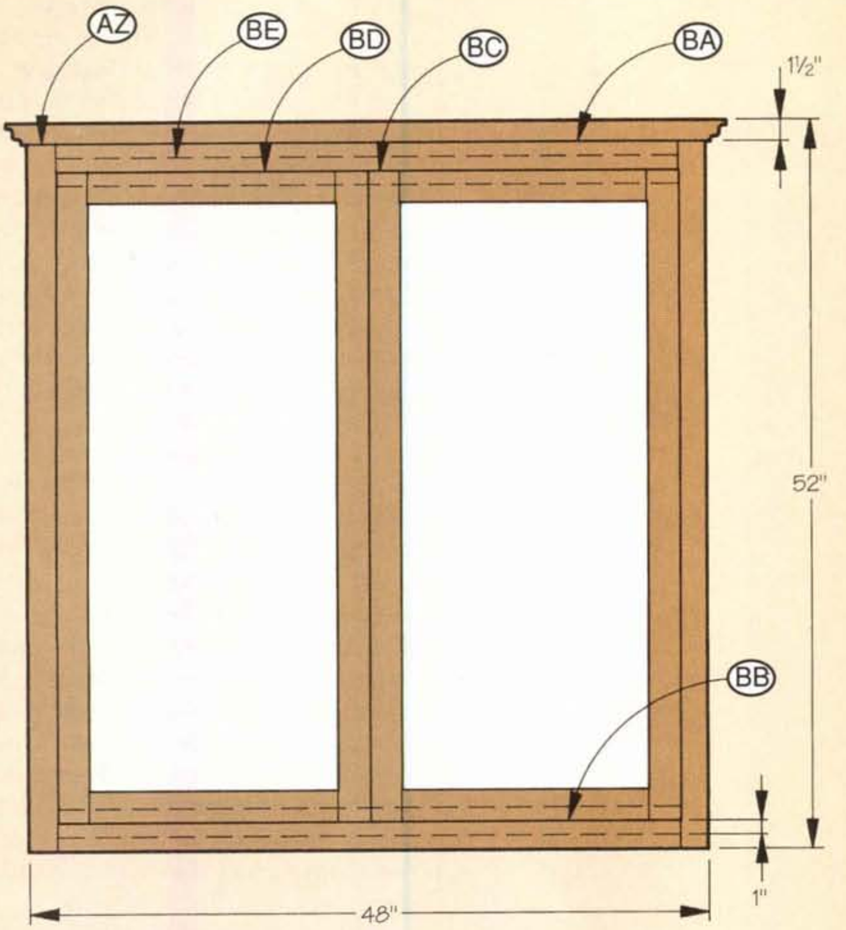


Figure 10. Upper Cabinet Front

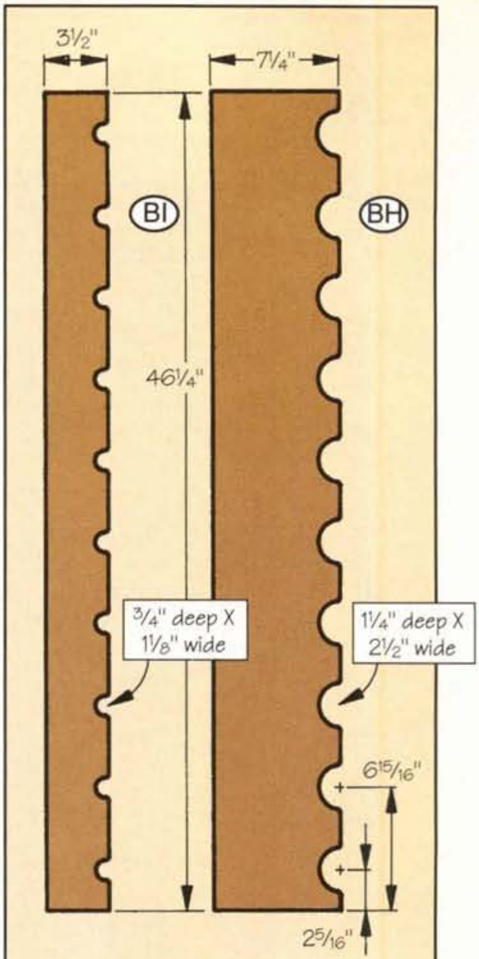
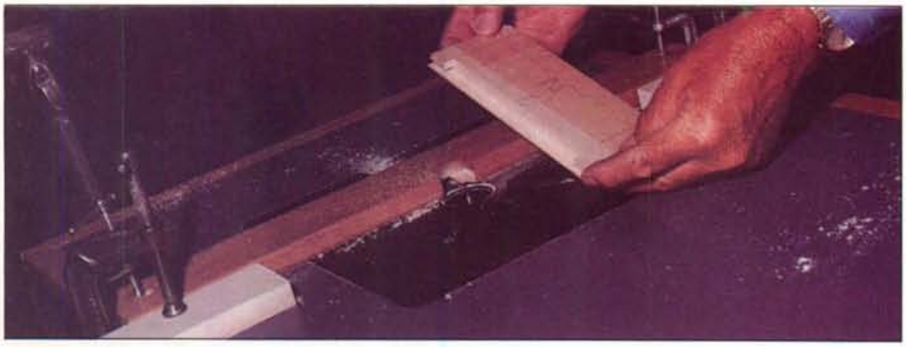


Figure 11. Rifle Rack Parts



***Use two stop blocks on your router table to cut the glass recess accurately in the stiles of the pistol door.***

## Sources

Constantine's, 2050 Eastchester Road, Bronx, NY 10461. 800-223-8087 (locks, hinges, drawer glides, flipper door slides)

Craftsman Wood Service, 1735 W. Cortland Ct., Addison, IL 60101. 708-629-3100 (drawer glides, Retract–Dors, hinges)

Trendlines, 375 Beacham St., Chelsea, MA 02150. 800-767-9999 (display lights, drawer glides, monorail glides, Retrac–Dors)

The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374. 612-428-2199 (hinges, locks, surface bolts, glides, flipper door hardware, display lights, painted porcelain knobs)

***Set the glass in the three doors with a small bead of silicone. Then secure the retaining strips with brass screws.***

# Too Many Panels?

### by Rob Cook

So you love the gun cabinet; it will get everything out of the closet and under lock and key, but *forty–two raised panels!* Well, how about cutting that down to only fourteen flat recessed panels? The cross–section of the new panels is shown in Figure 1 on page 64.

Eliminate these parts (78 total pieces) from the Cutting Lists:

- → lower cabinet—2 of D, 4 of F, 2 of H, 4 of I, 2 of J;
- → doors—8 of AK, 2 of AL, 12 of AM;
- → top cabinet—8 of AQ, 12 of AS, 16 of AU, 6 of AV.

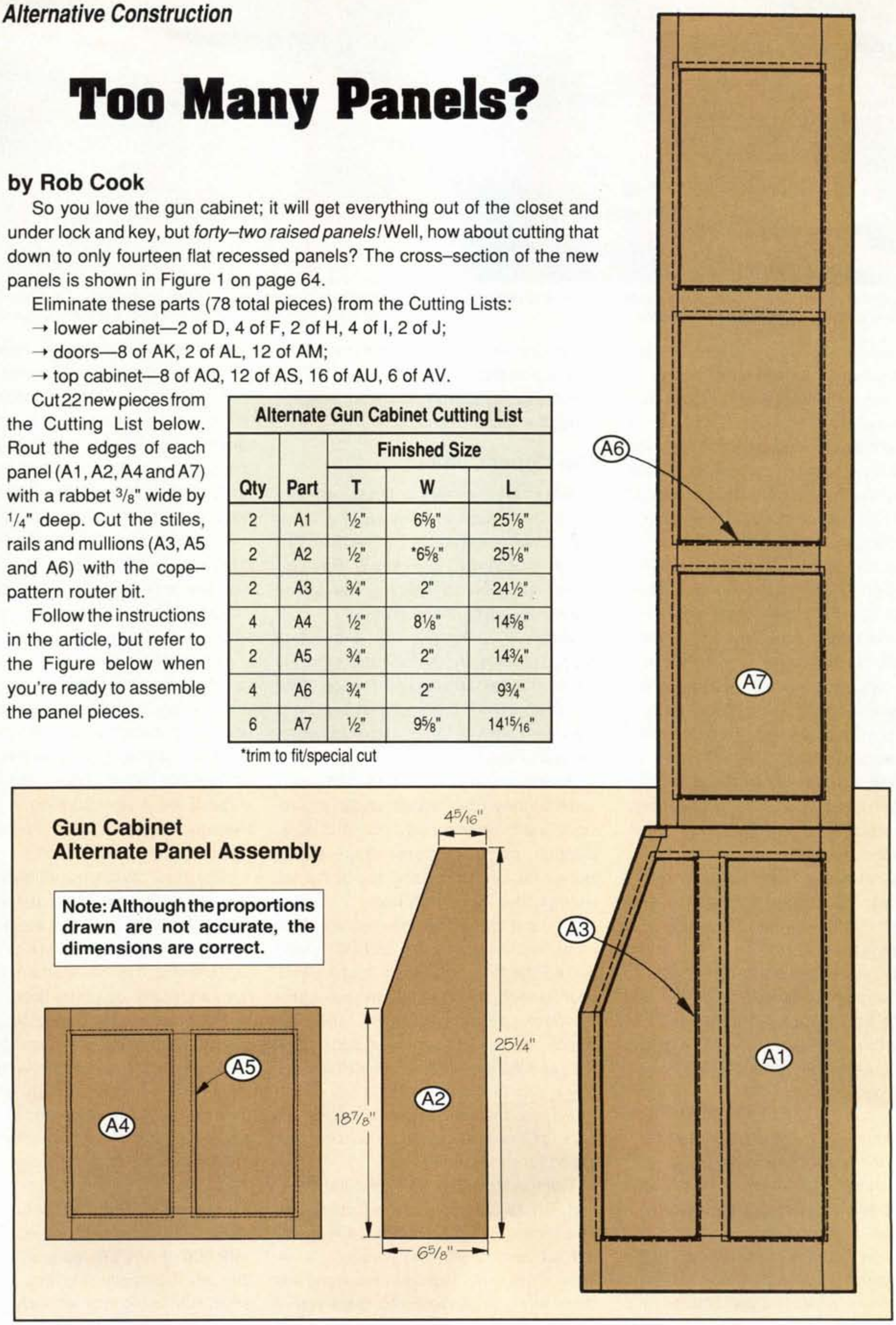
Cut 22 new pieces from the Cutting List below. Rout the edges of each panel (A1, A2, A4 and A7) with a rabbet 3/8" wide by 1/4" deep. Cut the stiles, rails and mullions (A3, A5 and A6) with the cope–pattern router bit.

Follow the instructions in the article, but refer to the Figure below when you're ready to assemble the panel pieces.

**Alternate Gun Cabinet Cutting List**

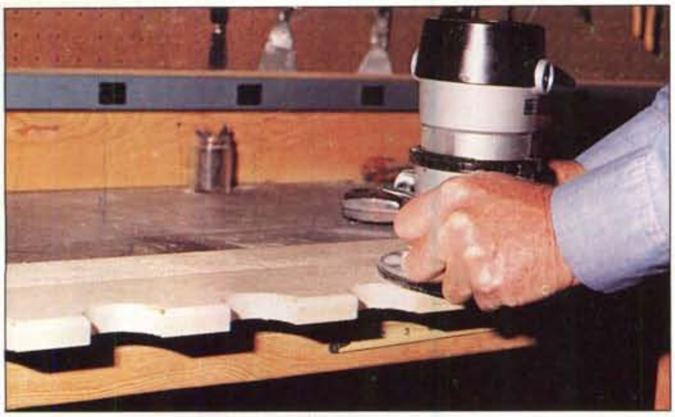
| Qty | Part | Finished Size T | W | L |
|---|---|---|---|---|
| 2 | A1 | ½" | 6⅝" | 25⅛" |
| 2 | A2 | ½" | *6⅝" | 25⅛" |
| 2 | A3 | ¾" | 2" | 24½" |
| 4 | A4 | ½" | 8⅛" | 14⅝" |
| 2 | A5 | ¾" | 2" | 14¾" |
| 4 | A6 | ¾" | 2" | 9¾" |
| 6 | A7 | ½" | 9⅝" | 14 15/16" |

*trim to fit/special cut



**Gun Cabinet Alternate Panel Assembly**

**Note: Although the proportions drawn are not accurate, the dimensions are correct.**



*Use a roundover bit with a bearing to shape the two edges of the barrel rest and the upper edge of the stock rest.*

*I mounted two curio cabinet lights on the top of the upper cabinet to better display my guns when the doors are shut and locked.*

ammunition and other accessories be certain to use adequate drawer glides.

The sliding display shelf (Figure 5) is ideal for pistols, clips, knives and other flat paraphernalia. The four monorail drawer glides (photo page 67) will support up to 200 pounds. The monorail tracks (see the Source List) can be cut to any length and installed in any depth cabinet.

After completing the drawer installations, attach the face frame pieces. Recheck your measurements before starting on the doors. Nail the back (AI) into place after first staining and finishing it.

The pistol drawer door (see the photos on page 66 and 67) uses hideaway door slides for installation and offers the craftsman several choices. I elected to have the door slide into the top of the lower gun cabinet on Retrac-Dor slide hinges. There are several brands of flipper hinges available through various mail–order outlets. If you use retracting slide hinges, carefully follow the manufacturer's instructions. With Grant 513 slides you need to rout a 1/4" X 2" recess in the inside of the cabinet top for the track. You can avoid the extra work by simply hinging the door at the bottom and installing a pair of drop front supports. Cut and rout the pistol door stiles (AG) and rails (AH) and assemble according to Figure 7 and the photo on page 70.

The three glass doors have the stiles and rails cut with the pattern–cope cutters. Enlarge the groove for the glass (Figure 7) using a straight bit and your router table with stop blocks clamped to the table fence to prevent through cuts.

Build the two raised panel doors in the same fashion as the sides (Figure 8). The hinges need to be mortised into the face frame and door stiles. A template and a guide collar in your router make the job quick and easy (photo on page 68). After the doors are installed, measure, miter, and attach the trim moulding (AN). The decorative trim can be cut to your liking on either the router or shaper.

## The Upper Cabinet

Assemble the sides of the upper cabinet in the same manner as the lower cabinet sides and doors. Put the two sides together according to Figure 9. Pay particular attention to keeping everything square as you glue and clamp.

When everything is dry and out of clamps, rout a 3/4" X 3/8" rabbet on the inside ends of the sides for the top (AW) and bottom (AX). The back inside edge of the sides gets a 3/8" X 3/8" rabbet to accept the back (AY).

Attach the top with glue and wood screws (they'll be hidden under mouldings) and the bottom with glue and nails. Measure corner to corner diagonally to insure the overall squareness of the top cabinet; then nail on the back.

Cut and attach the upper cabinet face frame members (AZ, BA and BB) gluing and nailing them in position. Double check your dimensions; then cut and assemble the door stiles and rails (BC and BD). Attach the upper and lower door stops (BE) and the top (BF) and side (BG) mouldings. See Figure10.

Repeat the procedure for easing the back of the doors to accept the glass panes as shown in Figure 7.

Cut the stock rest (BH) and the barrel rest (BI) as called for in the Cutting List. The measurements shown in Figure 11 will accommodate most rifles and shotguns. Check your individual weapons and make any changes required. Once you've cut the notches in both pieces, use a roundover bit to shape the front edges (photo above left). Carefully measure your longest and shortest guns, taking things like scopes and sights into consideration, before determining the exact placement of the two rests. Mark their locations and attach them with glue and anchor them in place with 1 1/2" screws driven from the back of the cabinet. After finishing the notches, cover them with felt strips.

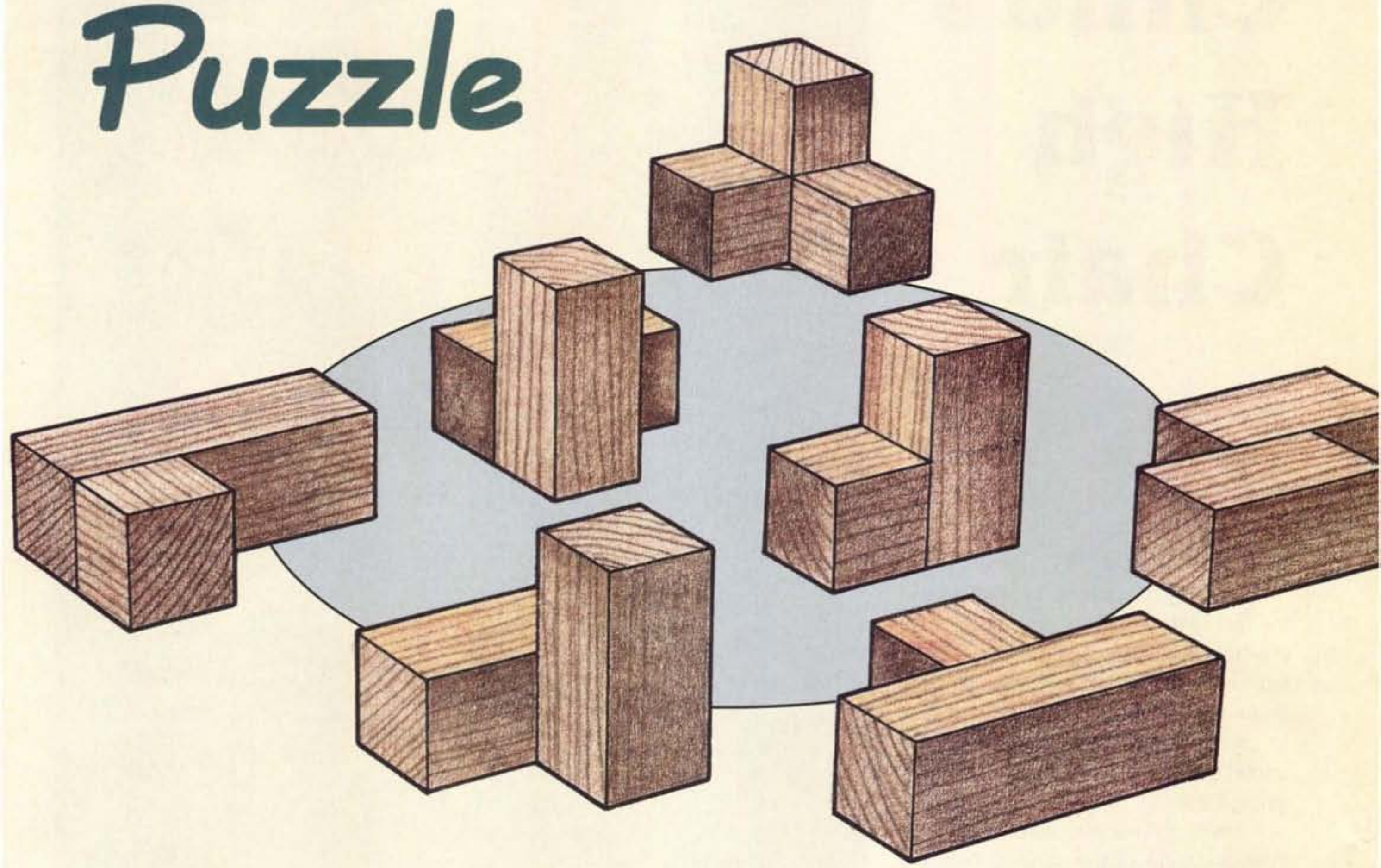
Use a small bead of silicone caulk to set the glass in all three doors. The pistol door also has two glass retainer strips (BJ) that attach to the door rails with small brass screws (photo page 70, bottom)

Secure the cabinet doors with 3/4" disc tumbler cam locks. The actual location of the locks and door knobs is optional, but if you elect to install the bottom cabinet locks in a lower position than shown in the photo on page 69, you must cut a slot in the front edge of the drawer support to provide a place for the cam to catch. Follow the lock manufacturer's instructions.

The pistol tray can be upholstered, lined with felt or flocked. The cabinets can be secured together with flat metal mending plates mounted on the back or with 1 1/2" lag screws and fender washers screwed in from under the top of the bottom cabinet.

I mounted two curio cabinet lights in the top cabinet (photo above) and one light in the center of the pistol compartment. The lamp cord is passed through small holes drilled in the cabinet back and plugged into a double surface–mounted receptacle mounted on the back of the lower cabinet. To control the lights install a switch near the top and side edge of the lower cabinet where it can be easily reached. Cut the hot wire that runs to the receptacle and run it through the switch and through another small hole in the cabinet back. Attach the lamp cord to the back with staples or clips. Simply unplug the lights to separate or to move the cabinets. PW

# Cube Puzzle



**Cube Puzzle**

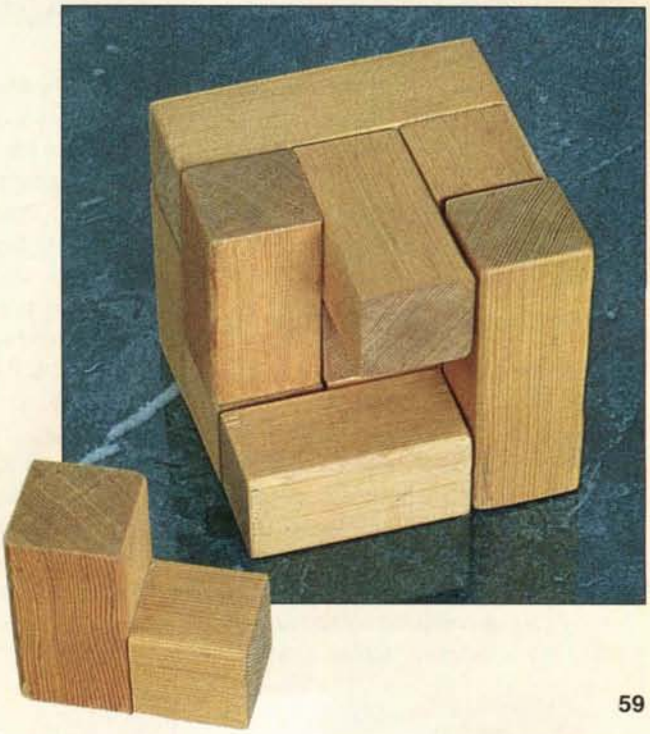
**Cutting List**

| | | Finished Size | | | |
|---|---|---|---|---|---|
| Qty | Part | T | W | L | Piece |
| 2 | A | 1½" | 1½" | 4½" | short |
| 8 | B | 1½" | 1½" | 3½" | mid |
| 5 | C | 1½" | 1½" | 1½" | long |

### by Harold McAleer

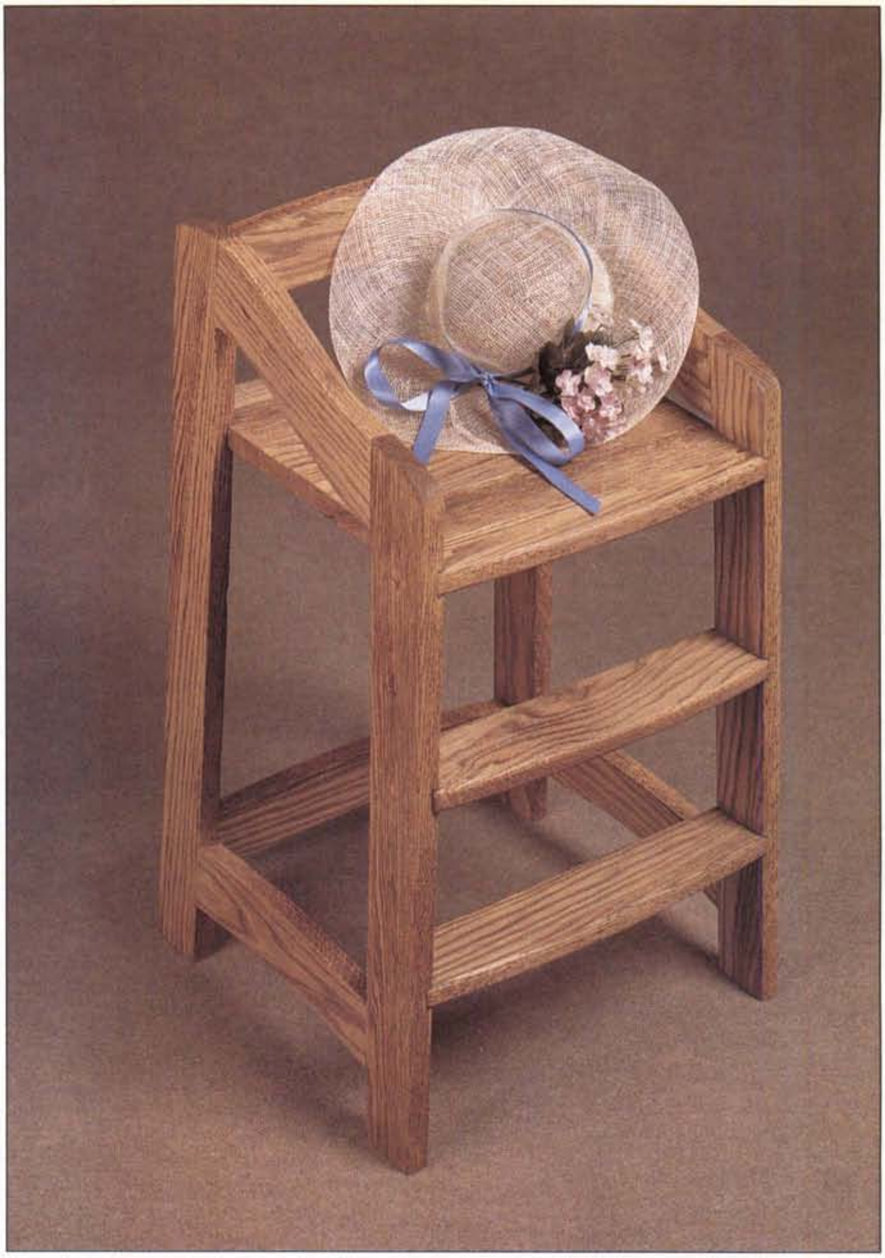
How fast can you assemble this puzzle in solid geometry? Faster than you can make it? Rip a length of 2 X 4 down to 1½" X 1½". From this square stock, cut the pieces as dimensioned in the Cutting List. Glue together the seven puzzle blocks as shown. Note that two are mirror images. Each is comprised of two parts except for one puzzle block which is made from one 3" piece (B) and two square (C). Have fun with the puzzle and don't be a square! PW

***Harold McAleer** works his wood Thoreau-ly in Lincoln, Mass.*



***A Popular Woodworking Project***

# Child's High Chair



### by Paul Gerhards

When my daughter was ready to join the rest of the family at the dining table, she needed a chair high enough to seat her comfortably, yet low enough to fit under the table's apron. The legs rise at an 87° angle in two directions for added stability. I used oak to match our dining table.

I made full–scale drawings of the front and side of the chair to help me accurately cut and assemble all of the pieces. A drawing of one side is sufficient, provided you maintain proper orientation of the right and left side pieces. A full–sized pattern is included in the PullOut™ Plans. Transfer the crucial measurements directly from the drawing to the stock. The full–size drawing will also help you to check the alignment during assembly.

## Construction

*Begin* by gluing up the blank for the seat (A). Make the blank 1" larger than the dimensions given in the Cutting List. Rip the legs (B and C) to a finished width of 2½", and the arms, stretchers, seat back, and steps (D, E, *F, G, H and I) to a* finished width of 3¼". Cut the parts 1" longer than the Cutting List dimensions to account for cutting the compound angles. Don't cut the curves in any of the pieces at this time. Before you begin assembly, study the Figure on the next page carefully.

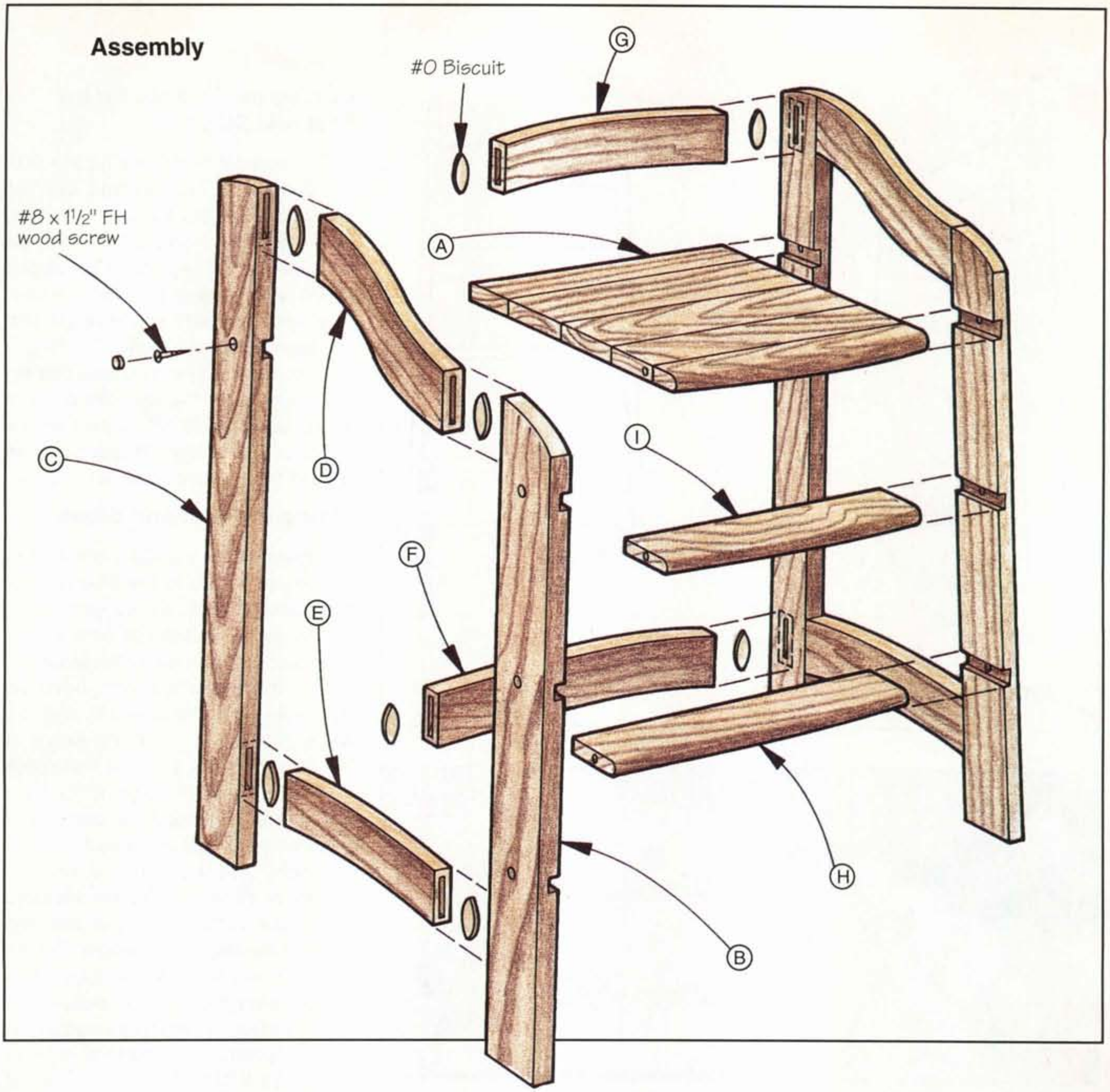
Place the right side legs directly on the PullOut™ Plans, outside surface up, and with both ends extending past the layout lines. Mark the bottom of the legs, and the points where the arm (D) and side stretcher (E) meet the legs (B and C). (Note: the feet and the dadoes for the steps and seat are cut at compound angles.)

Put the legs aside and place an arm (D) on the pattern. Mark and cut the angle of the upper end of the arm and check the fit against the leg (B). Repeat the procedure for the other arm. On a piece of scrap stock, determine the correct angle for the lower ends of the

**Child's High Chair**

**Cutting List**

| Qty | Part | Finished Size | | | Piece |
|---|---|---|---|---|---|
| | | T | W | L | |
| 1 | A | ¾" | 14½" | 12⅞" | seat |
| 2 | B | ¾" | 2½" | 25¼" | front legs |
| 2 | C | ¾" | 2½" | 28¼" | rear legs |
| 2 | D | ¾" | 3¼" | 10⅜" | arms |
| 2 | E | ¾" | 3¼" | 10¾" | side stretchers |
| 1 | F | ¾" | 3¼" | 14¼" | rear stretcher |
| 1 | G | ¾" | 3¼" | 11⅞" | seat back |
| 1 | H | ¾" | 3¼" | 14⅜" | bottom step |
| 1 | I | ¾" | 3¼" | 13⅝" | top step |



arms. Once satisfied with the fit, mark and cut the arm stock to length. Cut and fit the side stretchers (E) in the same manner.

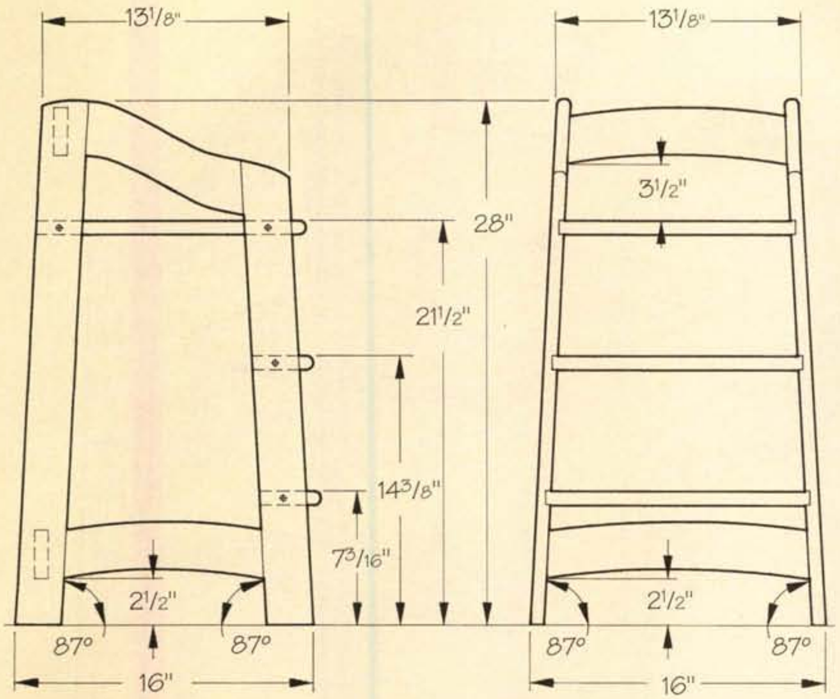
Use the PullOut™ Plans to make patterns for the side stretchers (E) and the arms (D). Transfer the pattern onto the stock, but don't cut the curves yet. Drawing the curves indicates the boundaries for the slots, and it's easier to do the slotting before the curves are cut. Slot the legs (B and C), arms (D) and the side stretchers (E). Cut the curves in the stretchers and the bottom of the arms. Do not cut the curves in the upper edge of the arms or the top end of the legs. This will be done after assembly to ensure a smooth transition. Sand the curved surfaces with a belt sander or drum sander.

## Assembling the Sides

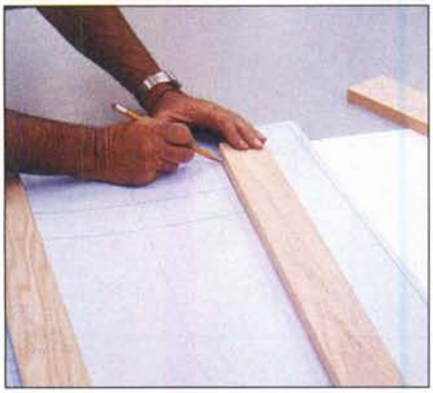
Before assembling the sides, make at least eight clamping wedges with a side angle of 3°. These blocks (four for each assembly), allow for even clamping pressure across the side assemblies when they are glued–up. These same wedges are used during final assembly.

Apply glue to the biscuits and the ends of the components. Bring the pieces together, checking for proper alignment. Clamp and set the assem-

***Use the full–size PullOut™ Plans to mark the joints and ends of the legs.***

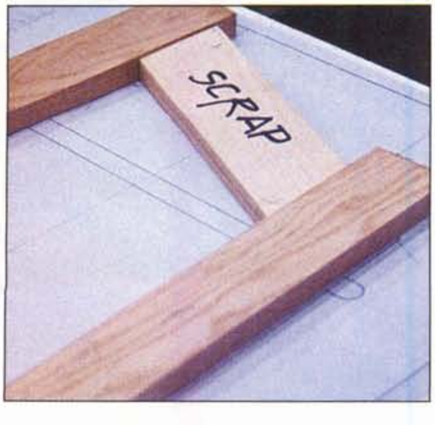


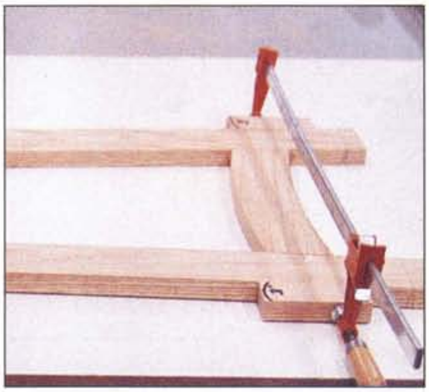
**Front and Side Views**



*Lay the arms on the PullOut™ Plans and mark the angles to be cut on each end.*

*Cut and place a piece of scrap stock between the legs to verify the fit before cutting the arms to length.*





*Glue and clamp the side assemblies together. Use the clamping wedges to insure even clamping.*

blies aside to dry. Cut and sand the curves along the top edges of the arms and legs after the glue has dried (photo top left next page). Sand the side assemblies with 150–grit sandpaper.

## Preparing the Seat Back and Rear Stretcher

Seat back (F) and rear stretcher (G) are fit and cut in the same manner as the arms and side stretchers. The pieces are inset ¾" from the back edge of the rear legs (B).

## Cutting the Dadoes for the Seat and Steps

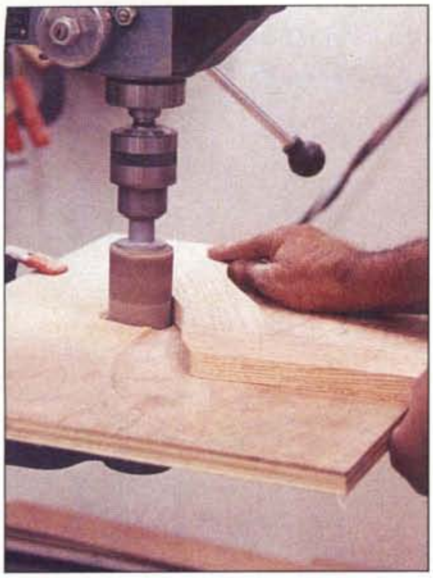
The seat (A) and steps (H and I) fit into dadoes cut into the legs. Lay out the dadoes and cut the legs to length. Before cutting the compound angles on the bottom of the legs, draw the angles on the legs (exaggerate them if necessary) and make sure you have the saw set correctly for each cut. It's easy to ruin the entire project by cutting one leg backward. After the legs are cut and the dadoes are laid out, round over the edges of all the legs (B *and* C), arms (D) and the side stretchers (E).

## Fitting the Seat and Steps

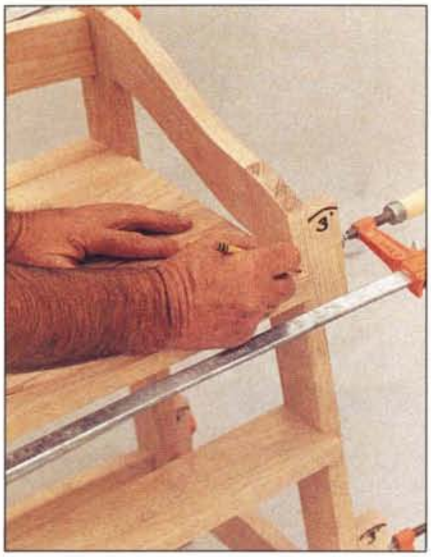
Dry–assemble the seat back (F) and rear stretcher (G) to the side assemblies using a clamp across each member. Measure the distance between the seat dadoes at the rear of the assembly and cut the seat to this width. Bevel the back edges of the seat (A) and the steps (H and I) to match the incline of the legs. Slip the seat (A) into place flush with the back edge of the legs. Clamp the seat and side assemblies together at the front of the seat.

Check that the legs are splayed equally at the front and back. Measure across the dadoes for the bottom step (H). Cut the step to this length. Slip the step into the dadoes and clamp it in place. Follow the same procedure to fit the top step (I). When everything is aligned, predrill and counterbore holes for the #8 X 1½" FH wood screws at the locations shown in the PullOut™

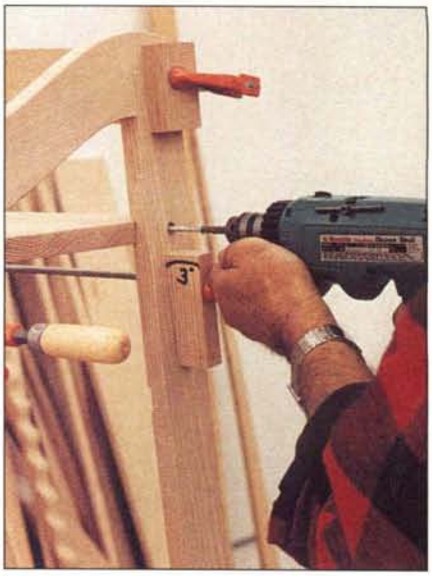
*Slot the side assemblies for the seat back and rear stretcher—inset the pieces ¾" from the back edge of the legs.*



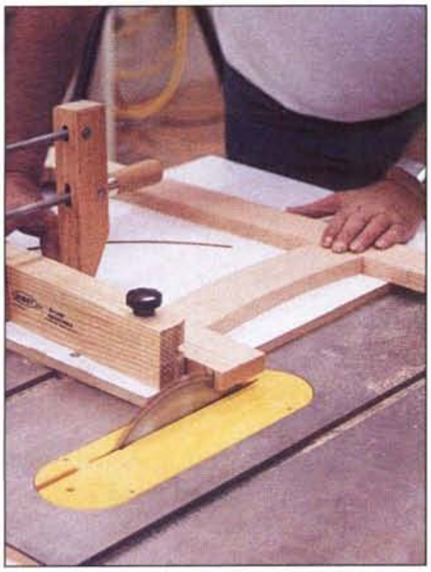
*Cut and sand the top edges of the side assemblies after the glue has dried.*



*Mark the front edge of the seat and steps after you clamp the side assemblies.*

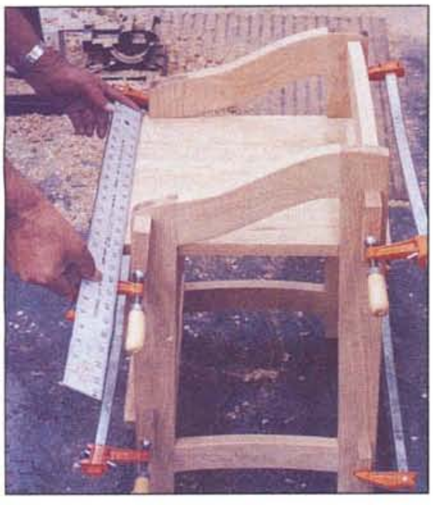


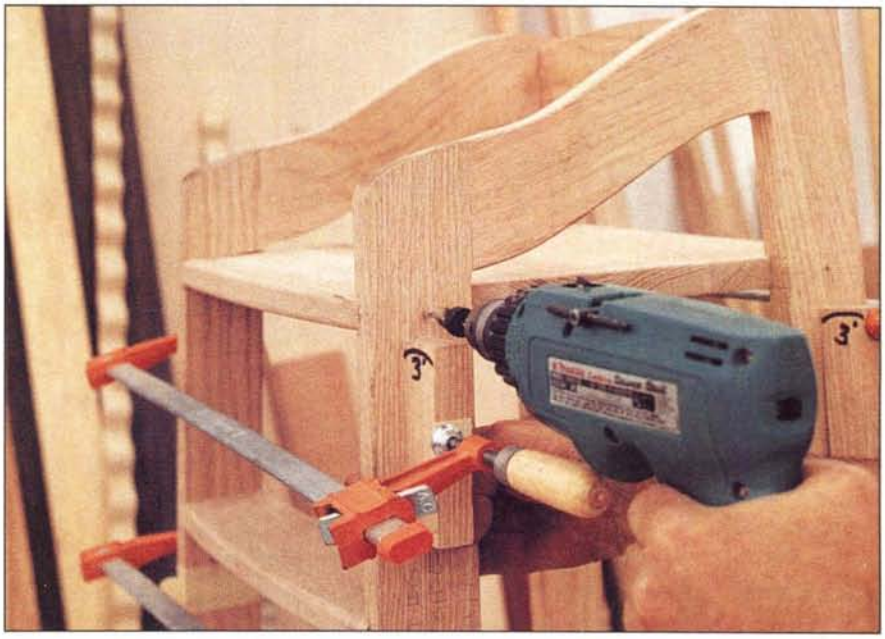
*Drill and counterbore holes in the sides for the screws for the seat and steps.*



*Cut the legs to length. Note that the ends of the legs are cut at a compound angle.*

*Dry–assemble the chair to check for fit and square before you do the glue–up.*





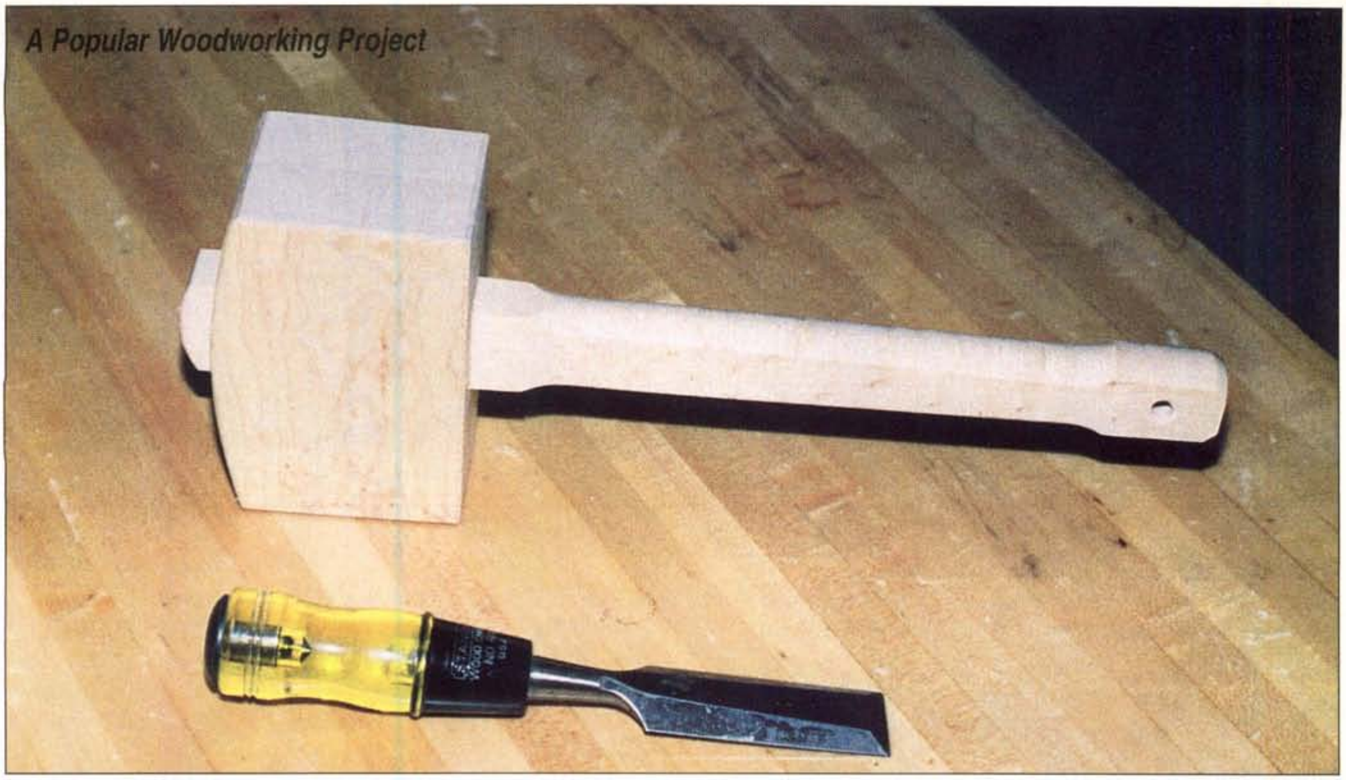
*Install the screws and plug the holes after you glue and clamp the chair together.*

Plans for the side. Mark the leading edges of the seat and steps where they meet the front legs (B), then disassemble the components. Using the pattern in the PullOut™ Plans, mark arcs on the front edges of the seat and steps. Cut the seat and steps to shape and round over the front edge. Sand the parts with 150–grit sandpaper prior to final assembly.

## Final Assembly and Finish

Working quickly, glue up and assemble the seat (A), seat back (F), rear stretcher (G) and steps (H and I) to one side assembly. Apply glue and position the other side assembly. Place the chair on a flat surface and check for wobble as you clamp all of the parts together. Install the screws in the ends of the seat and steps and set the assembled chair aside to dry. Clean up any stray glue; then sand the assembled chair with 220–grit sandpaper. Plug the screw holes with the method of your choice. Check the chair for wobble, and turn the feet as necessary.

I finished the chair with a single coat of Watco clear oil. After the recommended 72–hour drying time, I applied four coats of Flecto's Diamond Polyurethane finish. PW



# Make a Wooden Mallet

### by Bob Colpetzer

For years I have searched for a wooden mallet for striking my chisels. All the ones I've tried have had drawbacks. Heads would loosen, handles would break, or the mallet would be unbalanced. Out of necessity, I came up with a mallet design I'm sure you'll enjoy using as well as making.

The mallet features a reversed tapered handle that will not loosen with use, yet can be easily removed by tapping the heal of the handle on the workbench. This will enable you to make different size and weight heads for use with the same handle.

I've made heads with different shapes and I prefer the rectangular shape with the tapered faces featured here.

## Getting Started

Cut two pieces of 1 1/16" X 3 X 4 1/4" hardwood for the head and one piece 3/4" X 1 5/16" X 12 1/4" for the handle. Beech is probably your best choice, but is sometimes hard to find. Birch or maple work well and are your next best choices. I used birds-eye maple.

Make the taper jig for the mallet handle out of a piece of scrap plywood. Lay out and cut this jig to the dimensions given in Figure 1. Take care when cutting to hold a close tolerance, since the taper cut on the handle must fit the taper cut in the head.

## The Handle

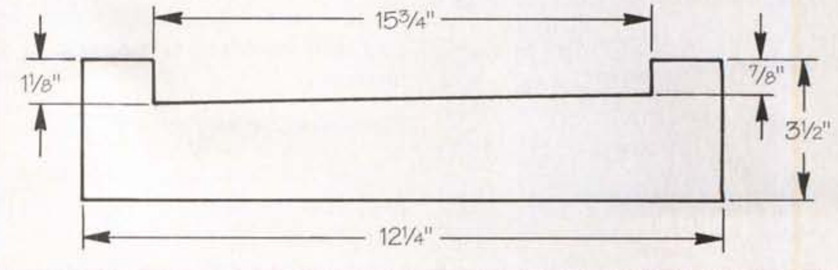
From one end of the handle blank, mark a distance of 4 1/4" and square this mark completely around the blank. Place the blank in the jig, with the layout towards the blade, and adjust the fence on the table saw so that the taper cut will begin at the corner of the handle. Cut the taper on both edges of the handle to the 4 1/4" layout line. Take care when backing the jig and blank out of the saw.

Once the handle has been tapered, locate the centers on each end and mount it between centers on the lathe. Turn the handle to the dimensions given on the Figure 2. After sanding to the desired finish, remove the handle from the lathe.

## The Mallet Head

With the table saw miter gauge set to cut a 1° angle, cut both ends of each half of the head. Both halves should be

**Figure 1. Taper Jig**



***Bob Colpetzer** works wood in Clinton, Tennessee and is a frequent contributor to* Popular Woodworking.

**Figure 2. The Handle**

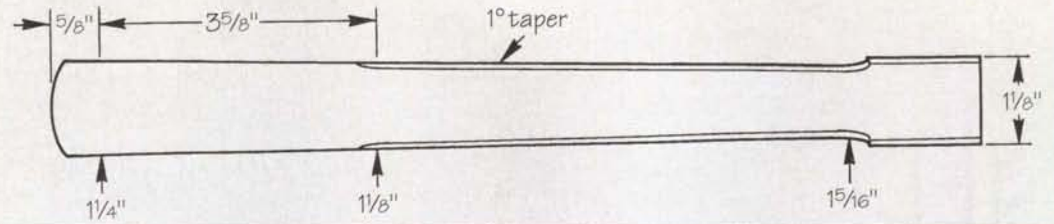
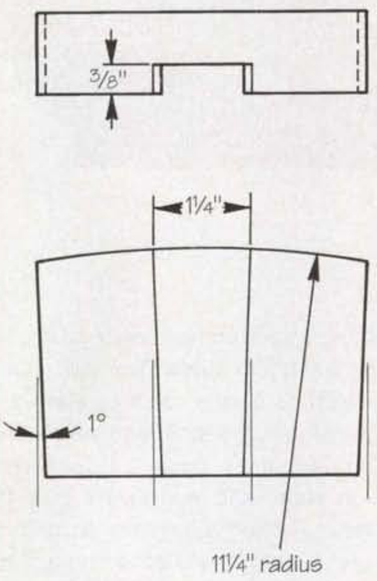
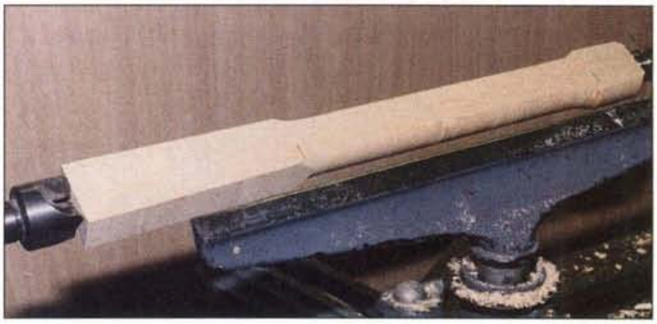
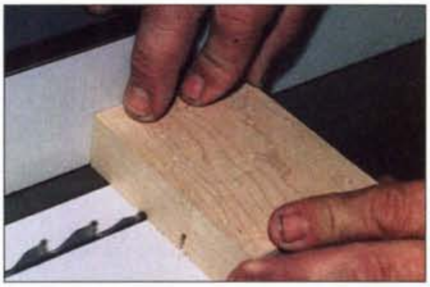


**Figure 3. The Head**

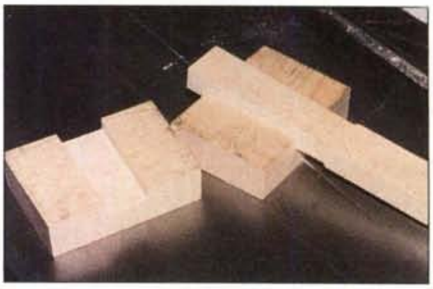




*Be careful not to chip your stock when rounding the grip and base of the handle on the lathe.*



*The sides of the taper dadoes in the mallet head halves are cut by placing the tapered end against the rip fence.*

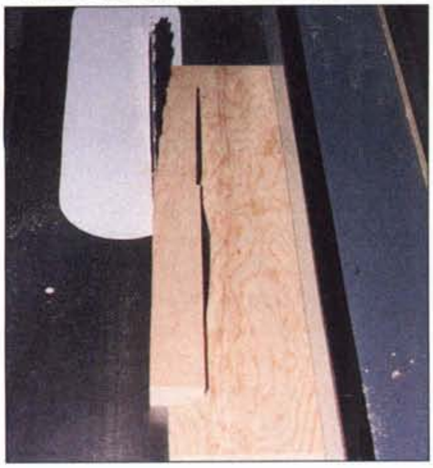


*Check the fit of the taper of the head pieces to that of the handle.*

the same size and the top should still measure 4¼" long, while the bottom should be 4 5/32" after mitering the ends.

Lay out the position of the tapered dado on the two inside faces of the mallet head as shown in Figure 3. Note that the sides of the tapered dado are parallel to their respective ends of the mallet. Set the rip fence so that the blade will cut just inside the layout line of the tapered dado when the end of the mallet head half is placed against the fence.

*Push the jig and handle into the saw. Then turn off the saw and back the piece out once the cut reaches the layout line.*



Set the blade depth for 3/8" and cut the sides of the dado as shown in the photo directly above. Remove the waste by readjusting the fence and making multiple passes, or use a straight bit in your router set to a depth of 3/8" and rout out the waste. Then test the tapered part of the handle in the tapered dado of the head.

If necessary, readjust the rip fence and make cuts to the sides of the tapered dado to bring the handle to the proper position in the head. Remember, make equal cuts on both sides of the dado to keep it centered.

## Gluing the Head

Glue the two halves of the head together by spreading a thin even coat of glue on the inside faces of the mallet head halves. Place the handle in position and clamp the two halves securely. Immediately remove the handle by tapping it's heal on the workbench. Clean the excess glue from the handle and the tapered mortise.

## Final Details

Lay out and cut a 1¼" radius on the head end of the handle. You might also want to drill a hole in the handle heel for hanging the mallet on your tool board. Once you've unclamped the head, lay out and cut the 11¼" radius as shown in Figure 3. Chamfer all edges of the head and finish sand.

Apply a clear sealer coat to the parts to keep them from getting dirty with use. I used Glidden's Quick Dry Sanding Sealer #5035, which builds a thin film that will not crack with use. Once the sealer dries, scuff-sand with 400-grit wet or dry abrasive and apply a thin coat of wax. PW

*A Popular Woodworking Project*

# TURNED TOOTHPICK HOLDERS

### by David F. Black

Ever notice that every time you need one thing in particular, it's never handy? That's the way it is when I need a toothpick. These two little turning projects are not only practical, they're a lot of fun to make. The smaller cherry holder fits nicely in a pocket or purse, and the larger osage orange holder decorates my dining table.

## Pocket Model

For the standard 2½" long toothpick, begin with a 6" length of ¾" X ¾" stock. Find the center on both ends as shown in the first photo below. The tool shown is a Veritas center marker available from Woodworkers' Supply (800-645-9292). Mount the piece between centers in your lathe and turn it to a ¾" diameter. I used a furniture scraper to ensure a straight–walled cylinder. This operation can be very dangerous—you don't want the scraper wrenched from your hands with a gush of blood. Keep the tool rest as close to the workpiece as you can.

Next, make a mark 4¼", and one at 5¼", from the drive center end of the piece. The first mark is the parting line between the barrel and the cap. Turn down ⅜" of the cap to a diameter of ⅝"; then part the two pieces.

Insert a ⅝" Forstner bit in the drill press and check it for square against the table. The Tri–Gauge shown in the photo (two squares and a magnet) are also available from Woodworkers' Supply. Mount the turned cylinder perfectly perpendicular in a clamp and secure it to the drill press table. It is essen-

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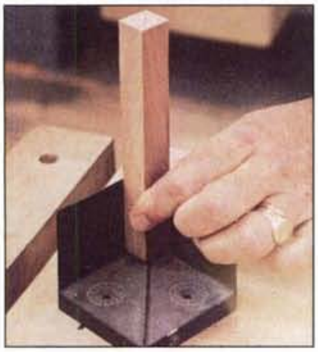
***David Black*** lives in Barnwell, SC and is a frequent contributor to our Tricks of the Trade.

***This piece is small, so find the exact centers to get a ¾" diameter cylinder.***

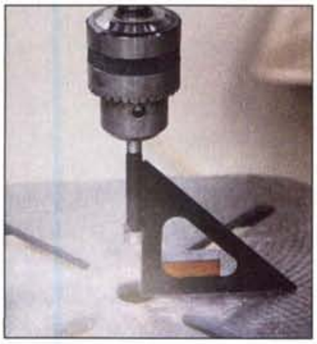


***Exercise caution when you use turning tools tools and scrapers.***

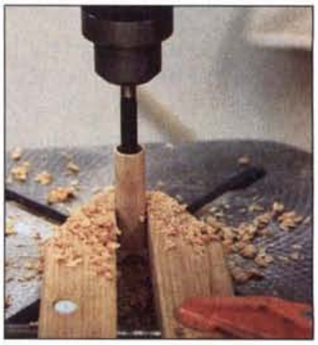
***Turn, measure, turn and measure again. Use sandpaper to remove the final molecules.***

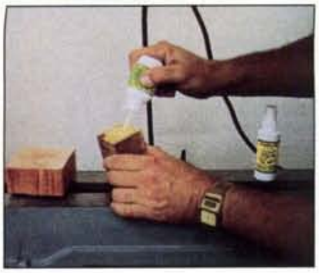
***Lightly hold the piece while parting it.***

***The thin walls of the case require a perfectly level table.***



***Any movement of the part can break out the side wall.***




*Read and follow the glue manufacturer's instructions–this stuff can glue your eyes shut.*

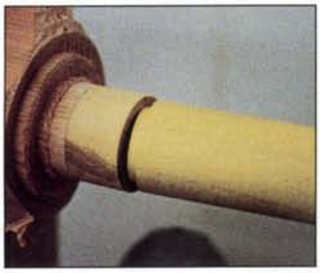
*Trim away the rough corner of the mounting block for better access to the work.*

*Not only does it turn like butter, freshly turned orange osage is gorgeous.*

*Make sure the top end is flat; then cut the lip parallel to the case body.*

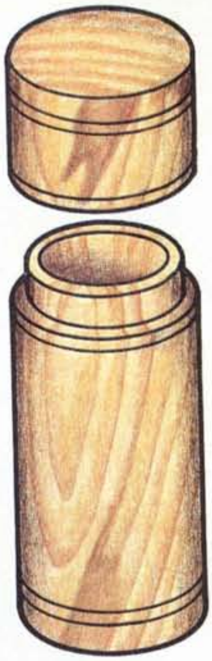
*Drill in 1"; then back out the bit—repeat until you've reached the proper depth.*

*The finished recess in the cap is ⅝" deep. Make sure the face is flat for a good fit.*


*Stop the lathe often and check the case–to–cap fit. All you need is a touch of snuggness.*

*If you don't have a live center for your tail stock, use a drop of oil to reduce the friction.*

*Fancy or simple, the finishing touches are limited only by your imagination.*



tial that your alignment is accurate—the wall thickness is only 1/16".

If the cap is a little snug, don't force it. Lightly sand the plug end of the cap until you get a slip fit. I finished my toothpick holder by soaking it in Deft semi–gloss for a few minutes; then I wiped away the excess and let it dry. The penetration of the finish helps strengthen the thin walls.

## Dining Table Model

For a different turning experience and to save materials, this larger toothpick holder was turned on a face plate. I used cyanoacrylate (CA) glue for a quick setup. First, cut two 2½" long pieces of 4 X 4 for the mounting blocks—I used fir. A mounting block connects a face plate and the work without damaging the work with screw holes.

Cut the case body and cap to size—3¼" and 1" long X 1⅝" X 1⅝". Find and mark the center on both sides of each mounting block. Attach the face plate to one of the mounting blocks with #12 X 1½" screws.

Next, spray the mounting block with accelerator, apply a generous amount of CA to the case body, align the two and press them together. In 30 seconds you're ready to turn. The CA I used is Satellite City's "Hot Stuff" Special 'T', and their accelerator is called Kick–It. These are available at most hobby shops of from Woodworkers' Supply.

Mount the faceplate on the lathe, set the lathe speed to 1000 rpm and turn away the edge of the mounting block down to the workpiece. Turn the blank to the desired diameter; then cut the lip ¼" wide and ⅛" deep. Mount a chuck fitted with a 1⅛" Forstner bit in the tail stock, and bore a hole to within ⅜" of the bottom. Go slow, and back out the bit often to clear away any wood chips. Lightly sand the case.

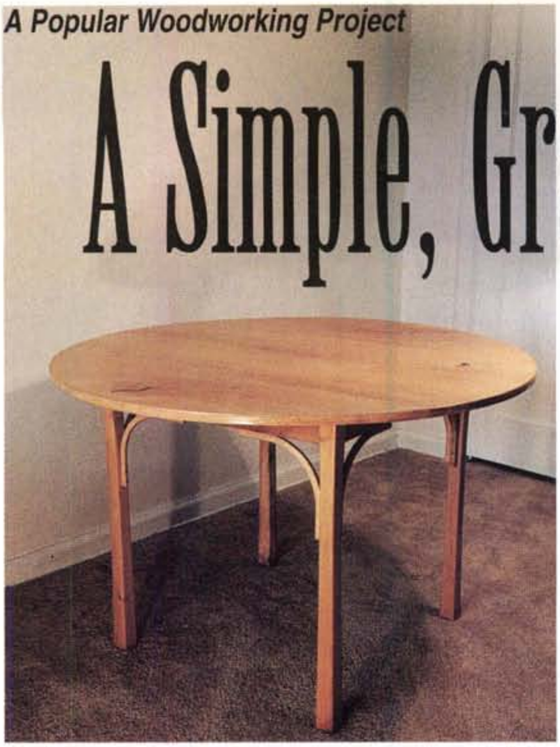
Attach the faceplate to the other mounting block and glue the cap in place. Turn away the rough corners of the mounting block to give yourself enough room to work—but be careful not to catch any of the mounting screws—and round the cap. Set the tool rest parallel to the face of the cap and gradually remove the core out to the edge of the lip on the case. Test fit the case to the cap often. Do not get the hole in the cap too wide—you can't go back! As you get close, use sandpaper to enlarge the opening.

When you're happy with the fit, remove the faceplate and re–mount it on the mounting block with the case. Place the cap in position, and mount the whole assembly between the centers. Sand the case and cap as one. Apply any decorative beading as shown in the final photo. The double bead hides the joint between the case and the cap.

Remove the pieces from the lathe and remove the faceplate. Cut off the mounting blocks on the band saw and sand the sawn ends of the two pieces. For the finish on this toothpick holder, I gave it several coats of paste wax. PW

*A Popular Woodworking Project*

# A Simple, Graceful Dining Table



### by Ken Sadler

This fairly easy project has a couple of unusual features. For one, the top "floats" over the legs; in fact, the design is in some ways similar to my "Contemporary Coffee Table" in *PW* #62 (September, 1991). Because of the floating top, braces are necessary between the legs and the frame. To avoid spoiling the appearance, these braces have to be light and delicate, yet still strong enough to do the job. We'll come to that later; start by cutting the main frame members—the stretchers (A), top supports (B), and legs (C) to size according to the Cutting List.

## Tenons and Notches

To fabricate the stretchers (A), first write "bottom" on one edge of each for reference. Cut the tenons as shown in Figure 1, but do not cut the bevel on the tenon ends or the curved cutouts at this time. To be sure that the distance between the tenon shoulders is exactly the same on all pieces, make the cuts in the following manner. Set the saw blade to a height of ⅛" and the rip fence to 1" from the far side of the blade. Check your miter gauge to be sure it's square with the blade—use a square; don't depend on the gauge indicator. If these shoulders are not square, the structure will not go together properly. With an edge against the miter gauge and an end against the rip fence, make the shoulder cuts on both ends of each piece. Raise the blade to ¼" and with the bottom edge down, make a cut on both ends. Raise the blade to 1¼", and with the top edge down, make the last shoulder cuts on both ends of each. Then use a tenoning jig to make the vertical cuts to finish the tenon.

The next step is to cut the notches in the stretchers to accept the top supports (B) as shown in Figure 2. The location of these notches is vital, and each stretcher must match exactly with the others, so it is best to cut them together. Place the top edges down, and with the faces together and the tenon shoulders flush, clamp them together at the midpoint. Draw a square line across all four stretchers on the top edge at the midpoint between the tenon shoulders. Measure 6¾" on each side of this line and draw lines. Mark the ends of the lines with a knife, so that when the top edge is down you can see the mark. Put a dado head in the saw set for a ¾" wide cut, and set its height at ¾". Check this width and height on a piece of scrap. Using the miter gauge, position the mark on the stretchers to the left side of the dado head and make the cuts.

Remove the clamp; then lay out and cut the curved sections. If you have a 2" diameter multispur drill bit, there is an easy way to do this. Clamp two stretchers together with their top edges mating and their tenon shoulders flush. On the top edge make a mark 1" in from the shoulder. With the pieces still clamped together and using the mark as a center point, drill through the pieces. Remove the clamp and cut the straight section with a dovetail saw or on a bandsaw. Clean up the face of the cut and put a slight radius on the side corners of the cut. Also put a slight radius on the corners of the bottom edge of the stretcher. Finish sand all faces that will

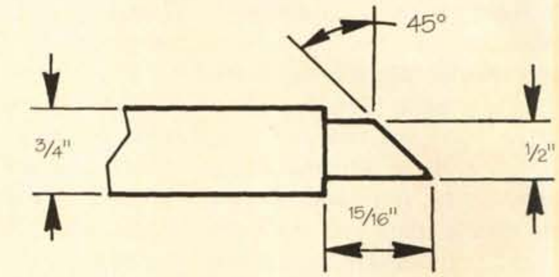


**Figure 1. Stretcher Tenon**

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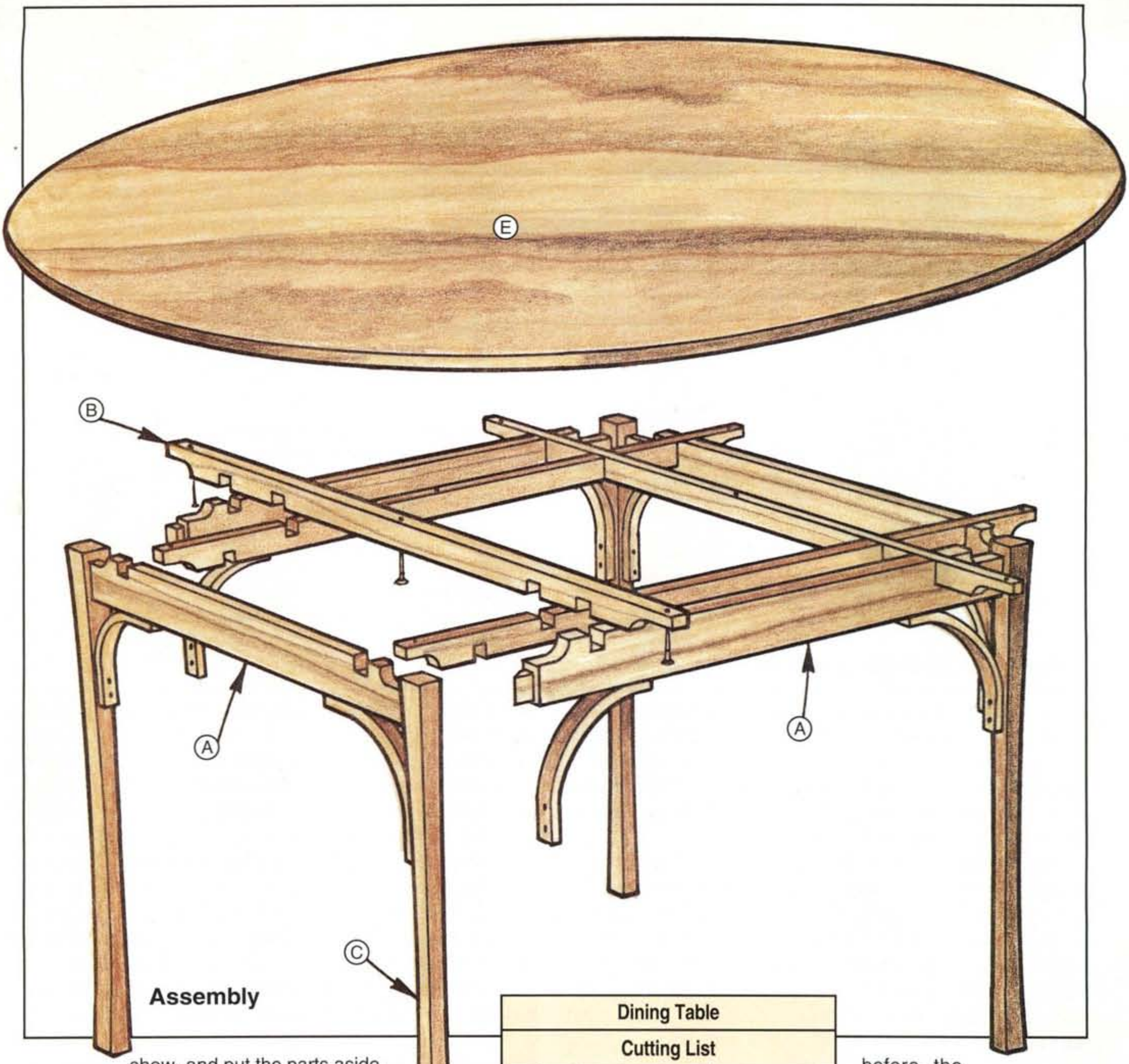
***Ken Sadler** is a retired furnituremaker living in Portland, Oregon, and a frequent contributor to* Popular Woodworking.



**Assembly**

show, and put the parts aside.

The top supports (B) come next. It's important that these fit in the notches you cut in the stretchers. It has been my experience that dado heads sometimes cut slightly under the nominal widths, particularly if they have been sharpened several times. If your pieces don't fit in the stretcher notches or fit very tightly, joint one face lightly until you have an easy slide fit. Please notice, in Figure 2, that there are two different versions of the top supports, and you need two of each. The difference is in the arrangement of the notches. To guard against error, mark one set of edges "top" and the other "bottom." Also mark the supports "1," "2," "3" and "4." Now place supports 1 and 2 with their bottom edge down and supports 3 and 4 with their top edges down. Clamp them together as you did with the stretchers and mark the edges that will be down in the same manner as before, the marks being 6¾" from the centerline (see Figure 2). Set the ¾" dado head to a height of one–half the width of the top supports, and run a test on a couple of pieces of scrap that are the same width as the supports. When the pieces make a perfect half lap joint, with the top edges flush, cut the notches in the actual top supports. Next remove the clamp and turn over supports 3 and 4, and clamp the four pieces together again with all the bottom edges down.

On the bottom edges, measure 10⅞" in each direction from the centerline, draw the lines and mark as before. Set the height of the dado head to ¾". Run a test on the same

**Dining Table**

**Cutting List**

| Qty | Part | Finished Size | | | Piece |
|---|---|---|---|---|---|
| | | T | W | L | |
| 4 | A | ¾" | 3" | 23" | stretchers |
| 4 | B | ¾" | 1½" | 30¾" | top supports |
| 4 | C | 1¾" | 1¾" | 27" | legs |
| 2 | D | 1½" | 2½" | 13" | brace blocks |
| 1 | E | 13/16" | 42½" | 42½" | top panel |

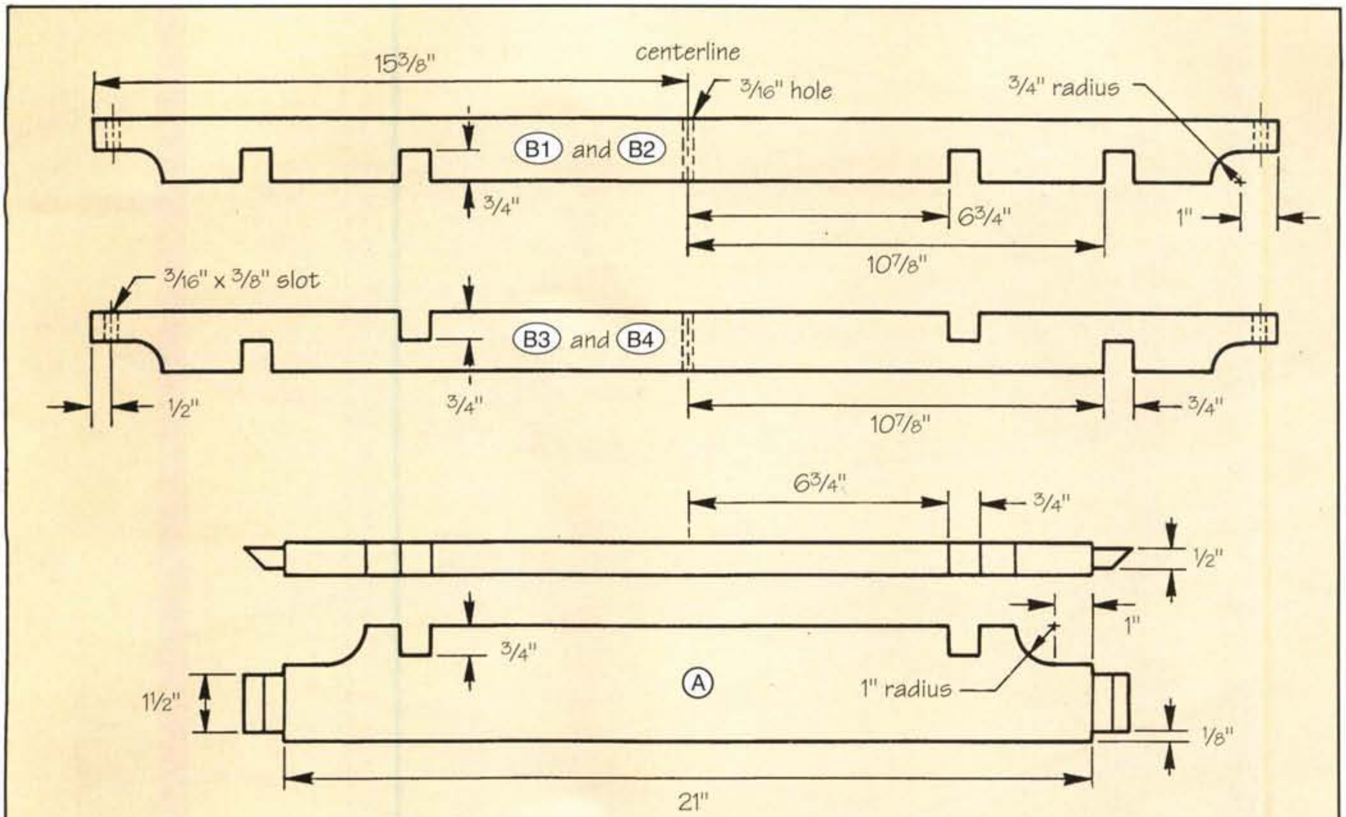


**Figure 2. Stretchers and Top Supports**

piece of scrap; then fit the scrap piece into a notch on one of the stretchers. The top edge of the scrap and the top edge of the stretcher must be flush. If you have made the notches in the stretchers slightly more or less than ¾" deep, you can correct for it with this cut. Having made the necessary adjustments, if any, cut the notches in the top supports.

Next, make the curved cutouts using a 1½" multispur bit using the same method you used on the stretchers. Last, drill a 3/16" hole from bottom to top on the centerline of each support, and counterbore for a flathead wood screw. Drill two adjacent 3/16" holes centered ½" from the outer ends of the supports. Using a thin file or chisel make these into a slot. Put a slight radius on the corners of the bottom edges of the supports and finish sand.

## Brace Blanks

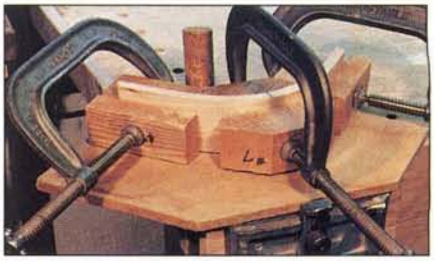
To make the braces, start with two blocks (D) that have one edge and one face jointed square with each other. From each block, cut four laminations that are ⅛" x 2½" x 13". Be sure that the saw blade is square with the table; otherwise, the laminations will not be of uniform thickness. Make the cuts with a planer blade if you have one, and keep the pieces together in the order in which you cut them. Tape each group together, mark the jointed face "inside."

To glue up the blanks from which you will cut the braces requires the construction of a small laminating jig as shown in Figure 3. This is a simple affair to make. Start with the base, you can use ½" thick plywood or chipboard. Cut the piece to 13" square, and leave it that way until the jig is built; then cut the corners as shown. The reason for cutting the corners is to allow better positioning in your bench vise when using the jig. The jig blocks and the clamp blocks can be cut from scrap lumber. When laying out the location of the jig blocks, note that the straight sections are at right angles to each other. This is a relatively sharp bend and a considerable amount of force is going to be required to pull the laminations into place. Therefore, it is best to *not only* glue the jig blocks in place, but to drive wood screws through the base into the blocks. Use two #8 X 1¼" flat head screws in each block. Be sure and draw the brace cutoff lines on the top and face of the jig blocks as shown on the drawing. Cut the clamp blocks to size as shown in Figure 3.

I suggest a dry run the first time you use any laminating jig. Get acquainted with the jig and how it works. Once you put glue between the laminations, the margin for error is greatly reduced. Take one of the groups of laminations you have made, and with the ends flush, draw a line across one edge of the group at the center point. Place the group on the

***Cover the laminating jig with wax paper so it doesn't become a permanent part of the lamination. It doesn't have to look good, just keep the wood from sticking.***

***Go through a dry run of bending and clamping the laminations for the braces. Clamp the center first, then add the other two clamps.***



jig with this line at the center of the curve and position the curved clamp block. Place a 6" C–clamp in position so that it bears about halfway up on the clamp block, and begin to slowly tighten the clamp until the clamp block is all the way home. Place the two side clamp blocks and their clamps in position and begin tightening—first one, then the other—a little bit at a time. When they have come in about half way, tighten the center clamp as tight as you can; then finish tightening the side clamps. If this has been accomplished without any problems, you are ready to use glue.

Before doing the job with glue, however, there is an additional and very necessary step that was purposely left out of the dry run. You must line the jig with wax paper. If you don't, you'll never get the blank out of the jig. Cut two strips of wax paper, and fasten them in place with masking tape. Don't worry about it being smooth, that doesn't matter. Just see that the face of the jig blocks and the entire flat surface of the jig in front of the blocks is covered—not only covered, but wrapped over the edges and taped to the bottom.

Apply the glue to all mating faces. Use an old 1" paint brush, and be sure all of each surface is covered. Put them back together in the same order they were before, and see that the center marks all line up. Place the group in position and apply the clamp blocks and clamps as before. With the glue in between, the laminations will have a tendency to move around. Try to push them back into place. You won't be able to keep them in prefect position, but being a little bit out won't matter—that's why the blank is oversize. Also don't worry if the glue squeezes out from between the laminations. Just leave it. It will be taken care of later. Allow the glue to dry twenty four hours before removing the clamps. When it comes out of the jig, some of the squeezed out glue will not be dry. Strip away the wax paper, and it will dry more quickly. Apply new wax paper to the jig, and glue up the second group.

## Making the Legs

While the brace blanks are drying, you can work on the legs (C). Joint two perpendicular edges of each so they are perfectly square to each other, and group the four legs together in a square with these jointed surfaces in the center. On the end that is to be the top, mark the mating faces in a clockwise direction from one to eight. Now decide which stretchers go where and mark, on the tenon at each end, the number of the leg face that it will mate with. You will mark and cut the mortises on the jointed faces.

On one leg measure 24½" from the bottom, and draw a square line across one jointed face. Lay the four legs on the bench side by side, ends flush, with one jointed face of each up, and transfer the line to the other three legs. Carry the line around to the second jointed face on each leg. This line locates the bottom edge of the stretcher. Place the tenon on the leg with the bottom of the stretcher on the line and mark the top and bottom lines of each mortise. Measuring from the inside corner, locate the inner vertical line of the mortise as shown in Figure 4, and after measuring the thickness of the tenon, locate the outer vertical line. Be sure to lay out the mortise from your actual tenon, not from the Figure. This is very important for a good fit.

When you have laid out all eight mortises, cut them. As shown in Figure 4, it is very important that they do not exceed 1" in depth. I've found that the easiest way to cut a mortise is to drill out as much of the waste as you can and then clean up the sides to the lines with a chisel. If you use a spur bit in a drill press with a depth gauge, you can be sure that you don't exceed the 1" depth. Set your gauge so that the cutting edge of the bit gives you your depth, not the point of the spur.

As you fit each tenon to its mortise, draw a line with a sharp pencil on the face of the tenon that shows through the opposing mortise as shown in the photo on page 72. This is the line to which you cut the 45° angle on the tenon. Be sure, when you make this mark, that you have the tenon in the right way, because if you cut the angle backwards you'll have to make a new stretcher. When the mortise and tenon have been properly fitted, be sure both tenons in each leg go home together, there should be a small clearance between the bottom of the tenon and the bottom of the mortise to allow room for excess glue.

Before going any further, it's a good

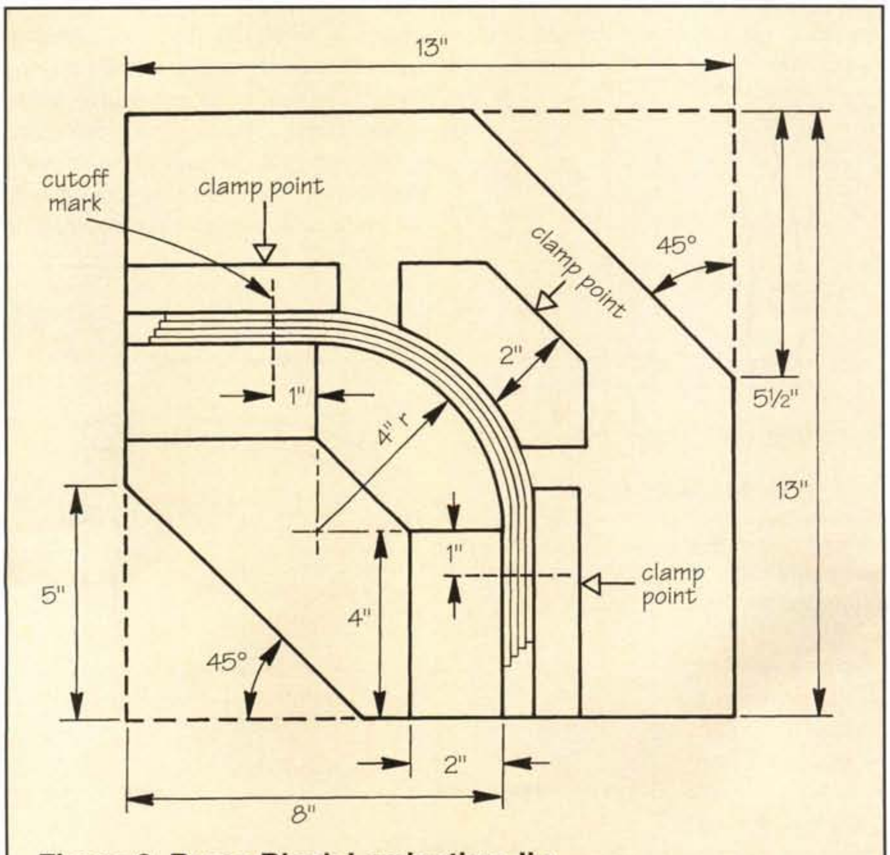
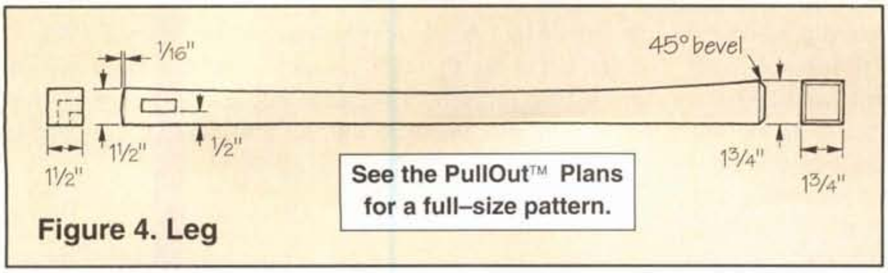
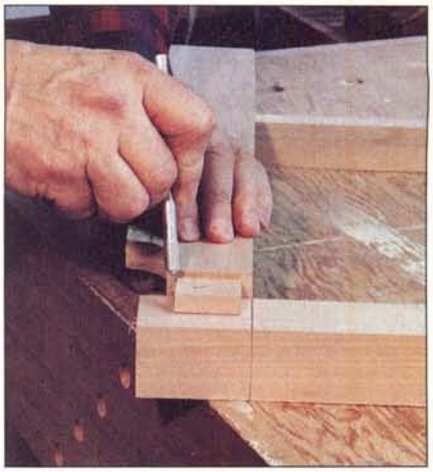


**Figure 3. Brace Blank Laminating Jig**

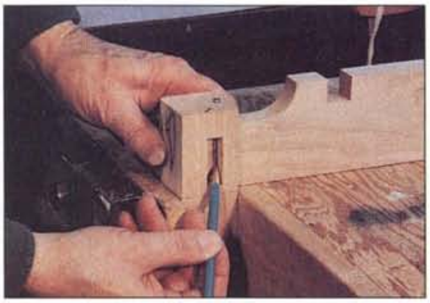


**See the PullOut™ Plans for a full–size pattern.**

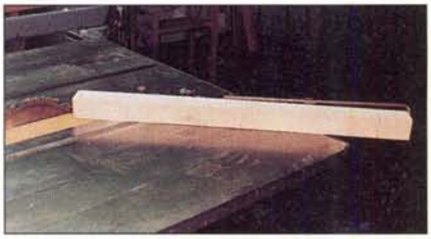
**Figure 4. Leg**



***Align the bottom of the stretcher with a mark that is 24½" from the bottom of the legs. Use a knife to mark the top and bottom of the mortise from the actual tenon.***



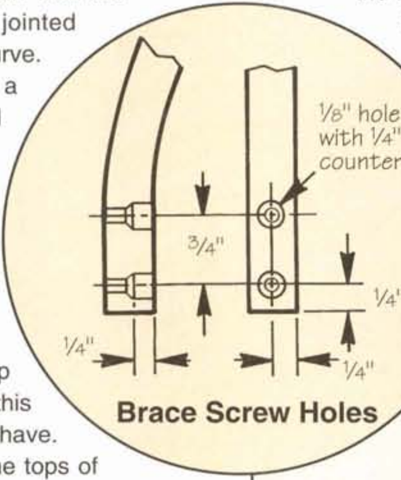
***Fit each tenon in its mortise; then trace the edge of the perpendicular mortise onto the tenon to show where to make the miter cut.***



***Attach a stop to the miter gauge on your table saw so you can cut a consistent bevel on all four surfaces on the bottoms of the legs.***

idea to assemble all the pieces and check that they fit together tightly and that the assembled structure is square in all directions. Assemble the legs and the stretchers first, then add top supports 3 and 4, and then top supports 1 and 2. Putting the parts together in this manner is the only way you can check for interference between the tenon ends in the mortises. This is your last chance to make adjustments, because the next step is to shape the legs, and once that is done, some of the surfaces will no longer be square or flat.

Begin shaping the legs by cutting the small bevels at the bottom. Set this up with the miter gage at 45° and a stop to position the leg correctly. Make the four cuts on each leg. Next, make a full–size template using the pattern provided in the PullOut™ Plans. Place the template on one of the outer surfaces of the leg—the ones without mortises—with the straight edge against the edge of the jointed face, and mark the curve. Bandsaw to the curve. then place the template on the newly sawn surface, again with the straight edge against the edge of the jointed face, draw the curve and saw to this curve. Save two of the waste pieces and cut a section from each end; these pieces will be very helpful in holding the legs in the vise while you smooth them. Smooth the sawn surfaces with a spoke shave, or use a file, followed by number 50–grit then 80–grit sandpaper. My advise is to get yourself a spokeshave. They're not expensive and they're a very handy tool. The next step is to slightly round all the corners, and this will proceed much faster with a spokeshave. At this time you should also round off the tops of the legs as shown in Figure 4. As a last step, sand all over with 150–grit paper. Be careful not to alter the flatness of the surface around the stretcher mortises.



**Brace Screw Holes**

Dry assemble the finished parts to make sure everything fits as it should. then take it apart and apply the glue. I suggest that you glue the legs and two of the stretchers first, as two separate subassemblies. Make sure the legs are square with the stretchers. Use clamps across the stretchers. Here again is where the curved waste pieces you cut from the legs come in handy. They make perfect pads under the clamps. When these subassemblies have dried, assemble the rest of the structure and glue it together. Make sure the assembly is square. Place clamps over the second set of stretchers and legs.

A word here about placing glue. When gluing a mortise and tenon joint, never put glue on the tenon. Put it around the top half of the mortise, the tenon will then spread it over the rest of the surface as it goes home. Be sparing in the amount you use, otherwise you may trap the excess in the bottom of the mortise and the joint won't go home. If you have a sloppy joint; then you can use more to fill the joint and help make it strong. In

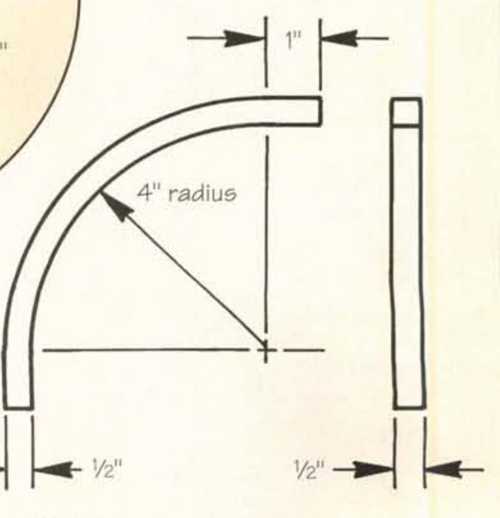
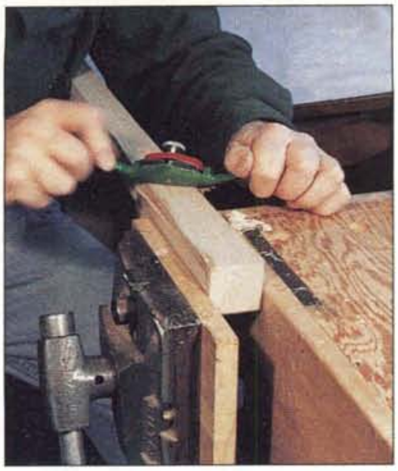
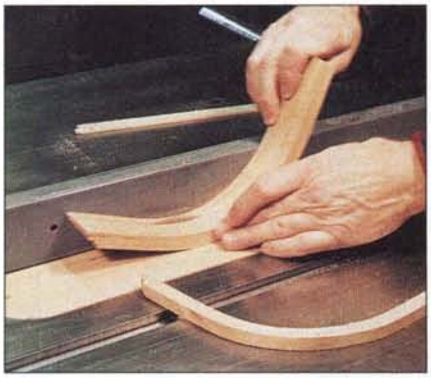


**Figure 5. Brace**



***Attach a stop to the miter gauge on your table saw so you can cut a consistent bevel on all four surfaces on the bottoms of the legs.***



***Pivot the laminated blank as you cut the braces from it, keeping the portion about to be cut flat on the table. Keep a thin, notched push stick nearby to finish the cut.***

gluing the top supports, put the glue in the bottom notches—some at the top of each notch face and a little in the bottom of the notch. If you use too much, it will squirt out and make a mess that will be difficult to clean up. If it should squirt out, don't attempt to wipe it up then; you'll force it into the pores of the wood and never get it out. Let it dry; then carefully remove it with a sharp chisel.

## Back to the Braces

It is time to make the braces from the blanks that you glued up earlier. The first step is to clean off any glue that might interfere with the outside surface going flat against the jointer fence. Joint one edge of each blank smooth and square with the outside face. Put the thinnest kerf planer blade you have in the table saw and set it at about 1" height. Set the rip fence at ½". This is a tricky ripping operation. Start with the leading flat surface down and feed slowly by hand, following the curve of the blank, until the trailing flat surface is down; then finish the cut using a push stick. You should get four braces from each blank.

Put each brace back in the jig and mark the cutoff points and trim the ends accordingly. Sand the braces smooth all over and, except for the first 1" of the outside at each end, break all corners with sandpaper. Now lay out, drill and counterbore the screw holes as shown in the detail in Figure 5.

To install the braces, place the structure upside down on your table saw with a leg at the edge, so you can easily get at both sides of it, and clamp it there. Put a brace in position with one end against the leg and the other centered on the edge of the stretcher. Clamp the end that is against the leg firmly in place. At the stretcher end drill 5/64" pilot holes, and drive in two #5 x ⅝" brass flat head wood screws. Remove the clamp at the leg end, and repeat the process. Now unscrew the brace, put a dab of glue in the center of each flat surface, and screw it back into place. Don't use too much, or it will squeeze out the sides. Install the other seven braces in the same manner.

The counterbored holes for the screw heads have to be plugged. There are two ways of doing this. If you have a ¼" plug cutter, cut plugs from the same wood out of which you made the braces. Glue them in place with the grain lines matching those of the braces. When the glue dries, trim them and sand smooth. If you don't have a plug cutter, use a piece of ¼" maple dowel. When the dowel pieces have been trimmed and sanded, it will look like you used wooden pegs to fasten the braces in place—a nice touch.

## Making the Top

Last—but really the most important—is the top (E). It's important because it will set the tone of the whole piece. It will be seen while the base will be noticed. It should be made from wood that has a distinct and interesting grain pattern and the boards should be chosen so that their patterns match at least reasonably well. You want the top to look, as near as possible, like it was made from one board.

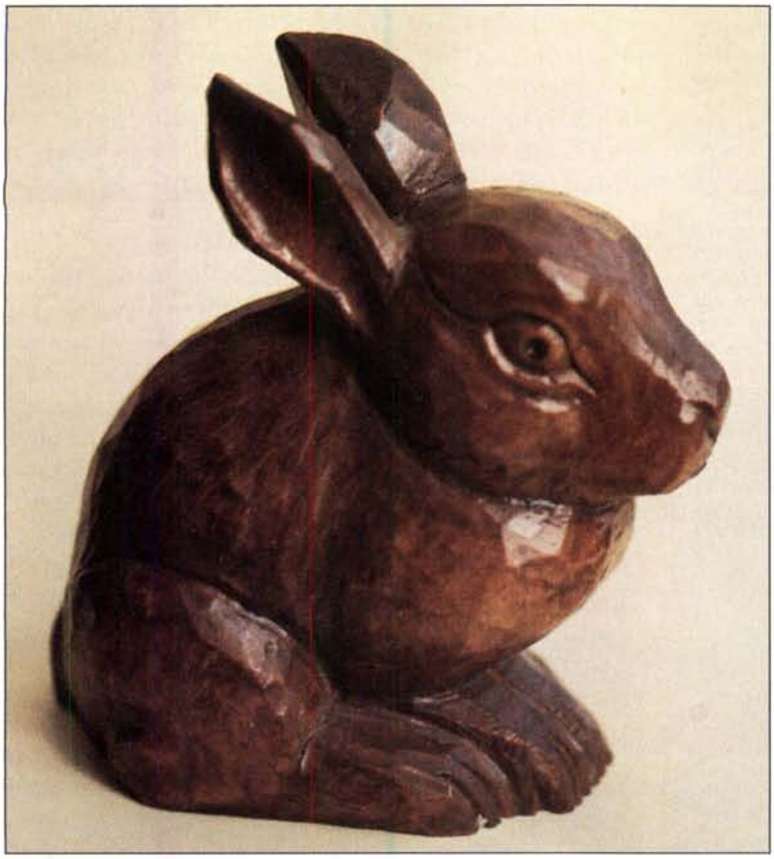
Glue up a panel about 42½" square. When it's dry, plane both sides smooth; then draw the diameter of the top using a beam compass. Do this on the surface that is going to be the underside. The easiest way to cut the top to shape is to clamp it to your table saw and use a hand electric jigsaw. I have used a bandsaw, but a top this size is very difficult to handle on the average bandsaw, especially by one person.

To clean up the cut edges, clamp the top vertically in your bench vise and use a spoke shave. This tool will do a neat, fast job and you can put a radius on the top and bottom corners as you go, thus avoiding a router setup later. If your spoke shave is sharp and you've been careful with it, you can finish the edge with 150–grit sandpaper. Sand the top and bottom surfaces, and the job is done.

To install the top, clamp it upside-down on the table saw. Position the base structure so that one set of top supports is parallel with the grain lines of the top. This is important because of the expansion and contraction that will occur in the top with the changing of seasons. For fastening use #8 X 2" flat head wood screws in the wide part of the supports and #8 X 1¼" in the narrow ends. Place screws in all the holes and slots, and tap them hard enough to make a mark. Remove the structure and drill 3/32" pilot holes ½" deep at each mark. Use a hand drill for this; an electric drill moves too fast, and a slight slip will find you through the top before you know it. It's a good idea to wrap a small piece of masking tape around the bit at the ½" point. Put the structure back in place and drive the screws. Your table is ready for finishing.

For the finishing operation, remove the top and finish it and the base separately—it's much easier that way. I use Formby's low gloss Tung Oil Finish. Apply it with a brush and let it soak in for several minutes; then wipe away all the excess with paper towels. Apply as many coats as it takes to get the amount of gloss you want. I've found that it's best to apply the first coat generously, and subsequent coats sparingly. Otherwise you waste too much and the stuff is expensive.

So, there you have it, an interesting and somewhat unique dining table that will elicit comment from your friends. PW



# Carve A Bunny

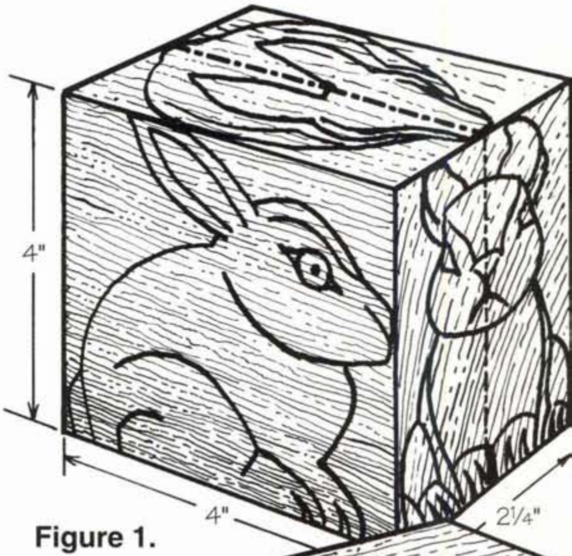


**Figure 1.**

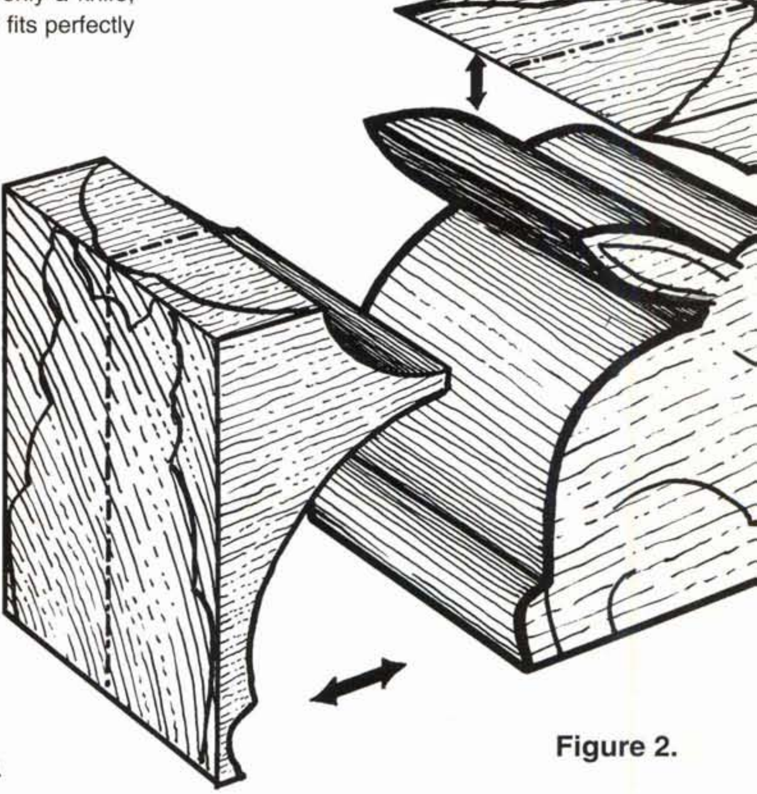


**Figure 2.**

### by Jack Ekstrom

This is a fun project for a carver with little experience, or for the expert who wants to make several quickly. The bunny's shape is symmetrical and simple with few details. You can carve with only a knife, but a small round gouge will be handy. The finished bunny fits perfectly in your hand.

## Getting Started

Start with a solid block of wood measuring 4" X 4" X 2 ¼" (Figure 1). I think basswood is the best all-round carving wood. Firm-grained cedar, mahogany, or butternut also work well. Pine and fir are not good for carving—their loose grain alternates between soft and hard densities. Balsa is too soft unless you're making models.

Transfer the bunny pattern to the wood so the grain runs horizontally. This make the bunny easier to carve and makes the ears and toes less likely to break off. There's still a danger of the ears breaking with a horizontal grain—so be careful not to put any pressure on the ears, and save their carving for last. Draw a centerline all around the wood. This will keep the bunny symmetrical. Transfer the outlines of the side, the top and the back views to your block with carbon paper.

The outlines will be sufficient for the initial cuts on

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***Jack Ekstrom** is a writer and illustrator from Colorado Springs, Colorado and former editor of* The Mallet*, the journal of the National Carvers Museum, for which this column has been named.*

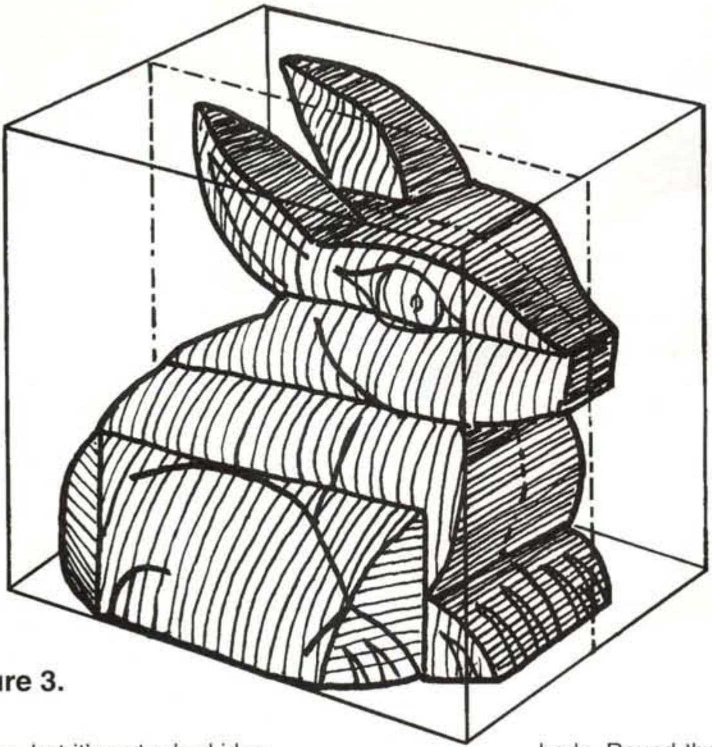


Figure 3.

a bandsaw, but it's not a bad idea to draw in the details to help visualize the form. You'll have to cut away and redraw details often—that's part of the process of carving from plans.

## Saving the Cutout

Most store-bought blanks are cut only on the profile. You can cut only this much, or use a knife for the whole project. I say if you have access to a bandsaw, why not let it do the busy work for you? Bandsaw the side view of the bunny first (Figure 2). Reassemble the front, top, and back pieces to the profile with transparent tape to cut the other views. Cut the back view next, then the top view, reassembling the cutoffs as necessary. Leave the wood between the ears until later to prevent them from breaking during the rough shaping. Redraw the centerline and the pattern details on your rough rabbit (Figure 3).

## Rounding

Begin the finer shaping by V-cutting underneath the ear where it joins the body. One side of the V is the line of the ear and the other is the line of the body. Round the back to the centerline, working from top to bottom. Slice just a little bit at a time, and use a leather strop to keep your blade sharp (Figure 4).

V-cut the front of the ears where they meet the body and round the top of the head just a little—the top can stay fairly flat. The brow ridges over the eyes should be angular, not round. Carve the top of the head in the opposite direction from the back. If you carve in toward the ears, the knife will get stuck.

## The Front

V-cut the curve of the legs and remove the wood along the top and front of each leg. Then V-cut under the head. These cuts are a lot like drawing. Hold your knife like a pencil. Pull or draw it along the pencil line, first at one angle of the V and then at the other until the wood inside the V comes loose. Keep V-cutting deeper and deeper.

V-cut the corners of the front feet and the chest. Make the bunny's chest round as shown as shown in Figure 5 on the next page. Hold the cutout on a flat surface and saw back and forth with your knife toward the toes. Turn the cutout over, being careful not to put any weight on the ears, and saw with your knife toward the head, V-cutting deeply underneath the chin.

## The Sides

Now comes the fun stuff! V-cut the backs of each leg along the pattern lines. One of your deepest V-cuts is right behind each knee. The other deep V-cuts are where the ankles of the hind feet touch the hocks of the front feet, and where the shoulders meet the chin.

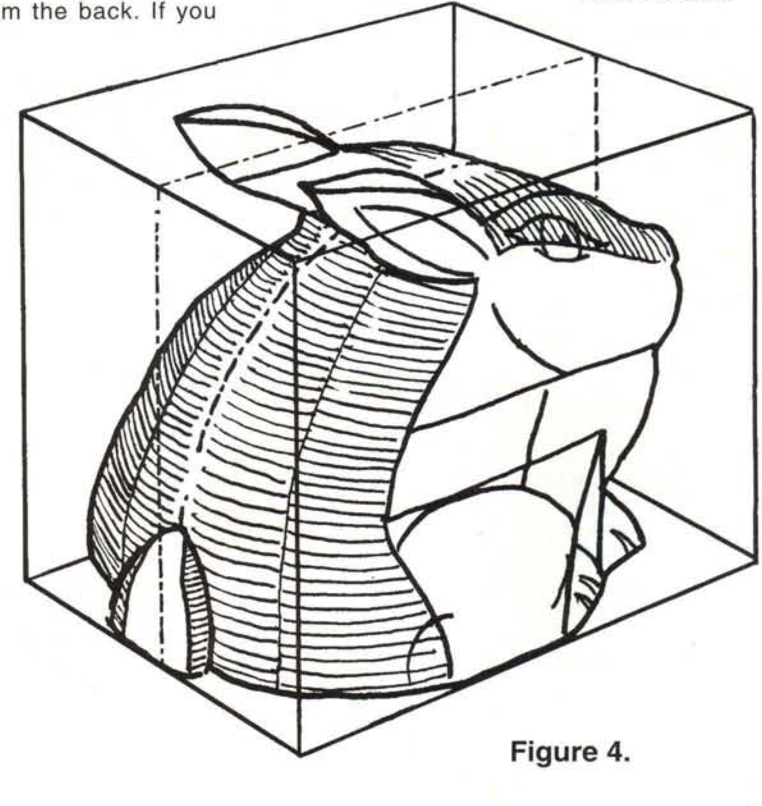


Figure 4.

### Safety Rules for Beginning Carving with a Knife

1. Always have adhesive bandages within reach and know what you're going to do if you cut yourself seriously.
2. Never cut toward yourself.
3. Never carve in your lap—keep the workpiece on the table.
4. Always keep your free hand behind the cutting edge of the knife and fingers.
5. Clamp your work to a bench or table when possible.
6. Cut down toward the table—the knife shouldn't fly into the air at the end of a cut.
7. Make small cuts—never try to cut too much at one time.
8. Don't force or twist the knife.

### Source

You can be purchase carving sets and strops plus wood cutouts from Warren Tool Co., Inc., 2209-1 Rt. 9G Rhinebeck, NY. 12572. Send $1 for a catalog of tools and supplies.

V-cut the shoulder lines from the feet to the neck. These lines can be left sharp or rounded with a gouge, as seen in the photo on page 72. Finish rounding the body and the bottom half of the head.

## Details

Use deep V-cuts to remove the rest of the wood between the ears. Finish rounding the back of the head, and whittle the backs of the ears round. V-cut the inside of each ear. The grain direction makes the ears easier.You can use a gouge, but be careful not to slip and cut the outside of the ears. If you do slip, carve both ears a little smaller—the bigger the ears, the better. Cut half the inside of the ears from one direction, and half from the other, meeting in the middle (Figure 7).

Round the front of the nose; then finish rounding the front of the head. Now is a good time to redraw the details on the stock. Use the tip of the knife to draw-cut the details. Two draw-cuts make a V-cut. Just cut a little bit at a time. Hold your breath and go very slowly. Go as deep as you can—the

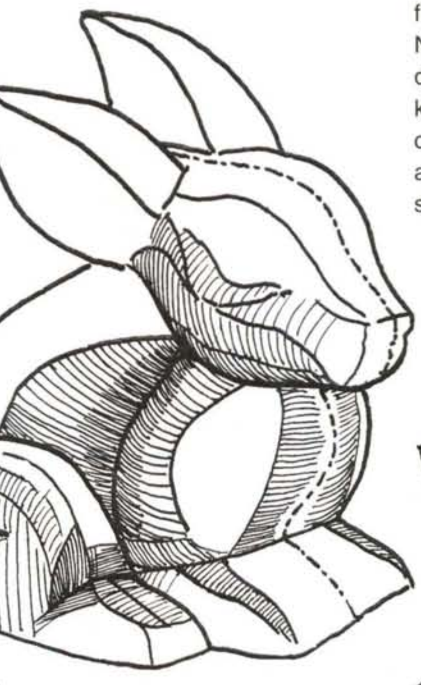


Figure 6.

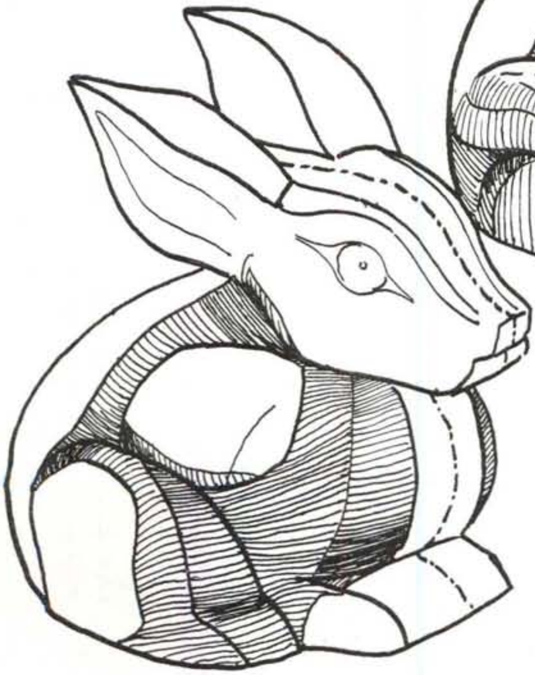


Figure 5.

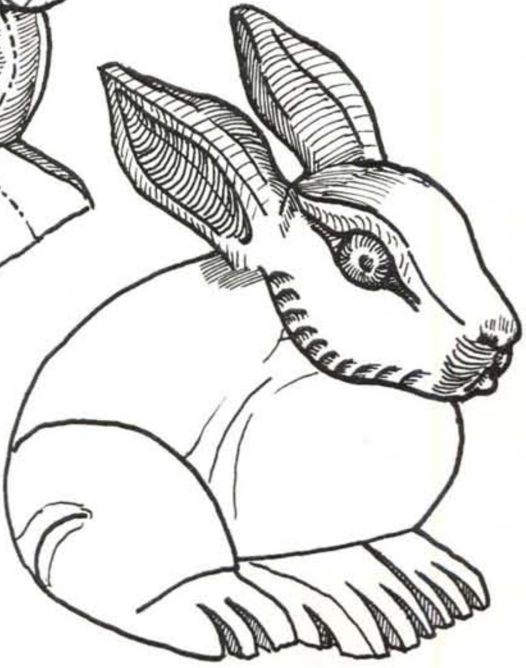
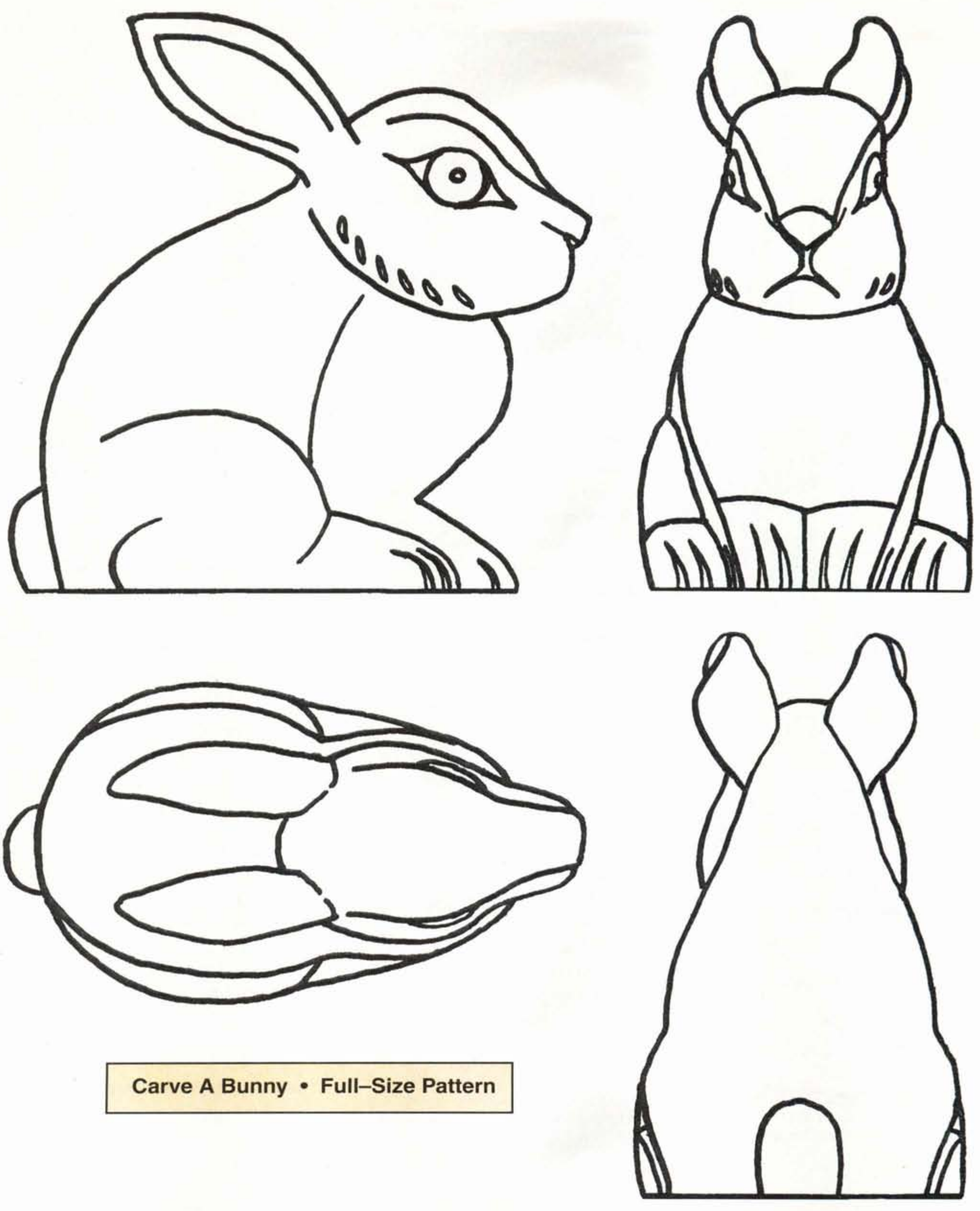


Figure 7.



**Carve A Bunny • Full–Size Pattern**

deeper the better, especially around the eyeballs.

Make the eyeballs as round and smooth as possible. They're hard to sand, so keep the knife sharp as possible for this task. Put the pupil in with the tip of the knife, twisting it in the direction of the sharp edge, or use a small gouge. Do the same for the whiskers along the bottom of the head, or simply V-cut them.

The last step is to V-cut the toes. These are fun, but don't get too enthusiastic and make the cuts too deep at first. Several little cuts are always much better than one big one.

Now sand the bunny all over. Don't try to get rid of the knife marks—just smooth them. They are the telltale signs of craftsmanship. Finish with tung oil; use a stain first if you like.

*A Popular Woodworking Project*

# Sweet Little Lemon Juicer

***A circle defines the waste area of the blank.***

***Be sure the blade tilts away from the fence.***

***Locate the significant turning landmarks, then turn to shape.***

***Use blocks to prevent the tabs from breaking when cutting the grooves.***

### by Don Kinnaman

There's something to be said about not using all those modern electrical helpers in your kitchen. For some reason, the juice is always more flavorful when you've extracted it by hand. The next time you bake that fresh trout or prepare a lush green salad, use this handy reamer to squeeze a little juice from the lemon right over the top. Cleanup is easy, and your food will taste better than with the stuff out of a bottle.

Turn your lemon juicer from a piece of 2" X 2" X 8" hardwood such as maple or birch. Don't use porous woods such as hickory and oak, or your duck *a l'orange* may end up with a lemony flavor. A glued–up blank is okay if you use waterproof glue, but a solid block is far better.

First square the blank; then draw diagonal lines on each end to locate the centers. Use a compass to scribe a 2" circle on one end. Set your table saw blade to 45° and adjust the fence to cut just to the outside of the circle. Remove the four corners. This procedure saves a lot of wear and tear on your lathe tools, and the triangular scraps make excellent glue blocks for inset panels and mirrors.

Mount the blank in your lathe and turn it to the dimensions shown below in the full–size template. A little lubrication on the dead center keeps the heat down. Use your lathe's speed guide to determine the correct turning and sanding rpm's. Sand with progressively finer paper and, as a final step, use a handful of turning shavings held against the spinning piece to impart a high sheen to the wood. A word of caution; don't burn yourself—the shavings can get very hot.

With the lathe stopped, use the tool rest as a guide to mark the center line of the eight V–grooves that are located every 45° around the juicer. Remove the juicer from the lathe and clamp it in your bench vise. Use a V–grooved chisel and mallet to cut the flutes. When they're all cut, remove the end tabs, sand and finish. I recommend using a couple of coats of mineral oil. It's an organic substance that won't break down and become rancid. PW

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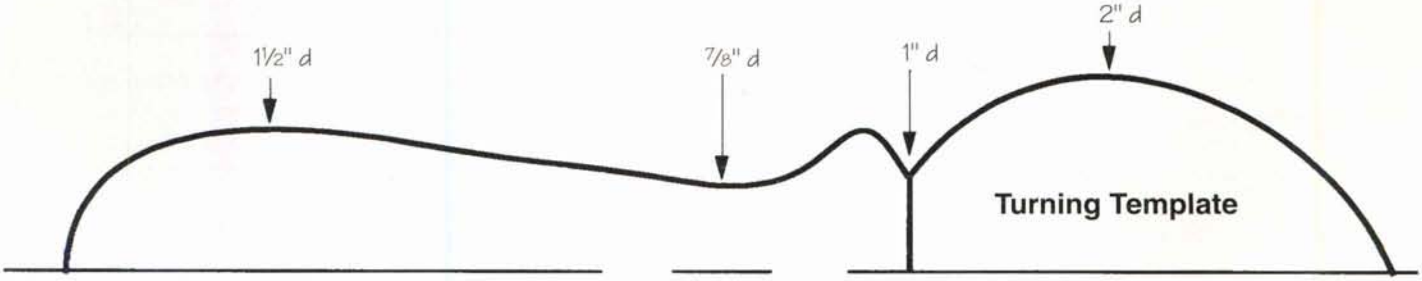
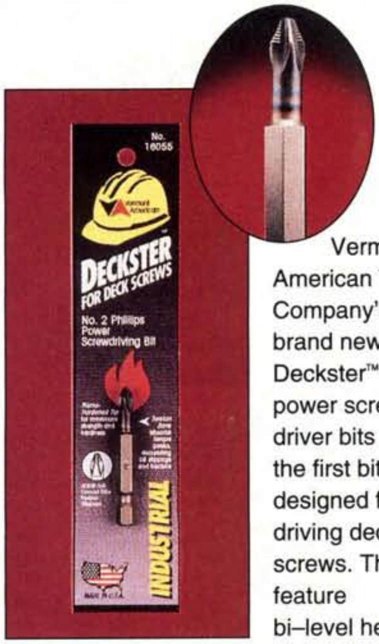
*Don Kinnaman is a retired woodshop teacher from Phoenix, and a frequent contributor to* Popular Woodworking.



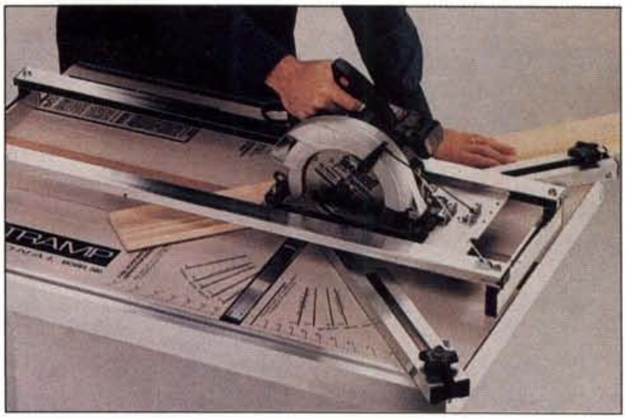
# News and Notes

New products to announce? Send a press release and a color photograph to the Editor, Popular Woodworking, 1041 Shary Circle, Concord, CA 94518, and we'll consider them for News and Notes.

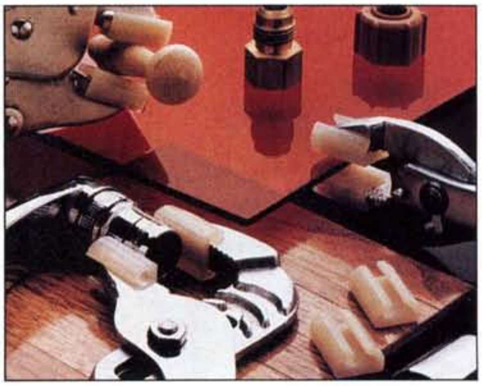


Vermont American Tool Company's brand new Deckster™ power screwdriver bits are the first bit designed for driving deck screws. They feature bi–level heat treatment and a torsion zone to absorb torque peaks. ACR® Anti–Camout Ribs grip the screws to reduce bit slippage. The bits are available in various Phillips and square recess sizes and lengths and are expected to retail for $1.00 to $3.00. (Vermont American, P.O. Box 340, Lincolntown, NC 28093. Tel. (704) 736-8013)

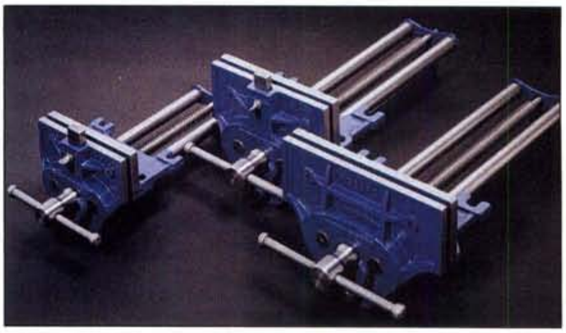
The Trimtramp® Professional 300 instantly converts any circular saw into a precision cutting compound miter saw. It features quick set–up for fast and easy cuts for crown moulding, trim and cabinet work. (TRIM-TRAMP LTD., 151 Carlingview Drive, Unit 11 Toronto, Ontario, M9W 5S4. Tel. (416) 798-3160)



Pli–Boots® are cushioning pads that will fit most plier type tools. They enable pliers to grip polished or soft metals, wood, plastic, glass without causing damage. They are tear and puncture resistant and not easily affected by solvents. Cost is $3.95 for a package of three. (Pli–Boots Inc., P.O. Box 365, Bulverde, TX 78163. Tel. (210) 438-4808)



CooperTools' popular Crescent locking pliers have expanded their line to include C–clamp pliers. The swivel pad model, with small area contact jaws, works well for woodworkers. The ergonomically designed grip on the bottom handle is easily released with one finger. Sizes range from 6" to 11". (CooperTools, P.O. Box 30100, Raleigh, NC 27622)



Woodworking vises from Record Tools have tough, durable castings for long, trouble free service. Precision machined housings provide smooth sliding movement. Record Tools, 1915 Clements Rd., #1, Pickering, Ontario L1W 3V1. Tel. (416) 428-1077.)

Just introduced by The Woodworkers' Store, Wunderfil™ is a duel purpose filler for everything from filling nail holes to smoothing wood grain. Use it straight out of the can for nail and screw holes, scratches, dents and similar imperfections. As a grain filler, it should be mixed with water to a heavy cream consistency. Quick drying, easy sanding, it accepts stain naturally. (The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374. Tel. (612) 428-3201)

# SCRAP SOLUTIONS

*Scrapwood Challenge #6 invited readers to design projects that make use of 4 X 4 shorts—you know, those cut–off ends of deck posts that are too short for any practical construction project and too full of pitch and wood preservatives to burn, but too good to throw away. A lot of people just stick them in the lathe and turn them into vases—but that seemed like the most obvious scrap solution. We were after more original ideas like the ones below...*

## Plywood Caddy

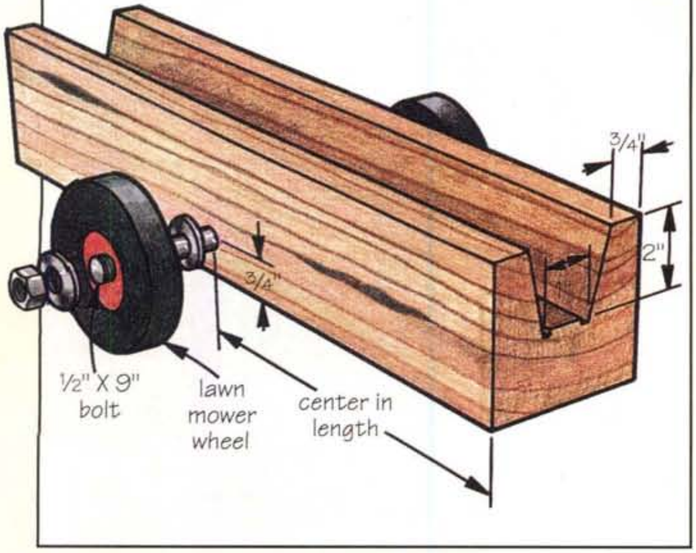
**HONORABLE MENTION**

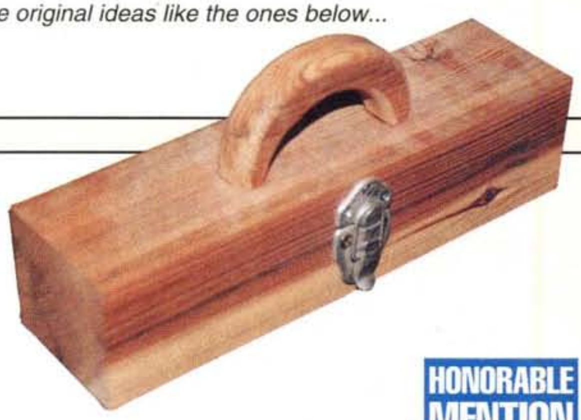
The material handler described below is easy and inexpensive to build and very useful in the shop or on the job site. It's perfect for moving heavy, stiff sheet material, such as plywood, glass and drywall, single–handedly without strain. You can also use them in pairs with a platform fitted to them for moving around cabinets or furniture. They can also work extra duty as infeed and outfeed rollers by inverting them on a tall sawhorse or table, or on customized temporary legs.

Slot a random length of 4 X 4 (18" works great) as shown below, making the width of the slot at the bottom at least 1". Use chisels to widen the top of the slot and arch the slot bottom to protect veneer face edges on plywood.

Drill the hole for the axle centered in the length and square to the face. Add wheels and washers on a ½" X 9" smooth shank bolt to complete. Five–inch diameter plastic wheels for lawn mowers work great. The dimensions are not critical, and may be adjusted to accommodate your wheels and axle.

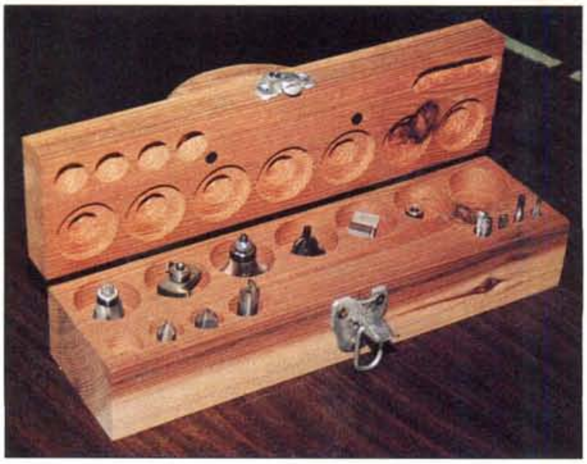
Nelson Brittle, Warrenton, Virginia





**HONORABLE MENTION**

## Router Bit Case



I started my router bit box by cutting a piece of scrap to 12½" in length, jointing all four sides to clean it up and then ripping the 1⅛" thick lid from the piece. I then marked a line 1" in from one edge and another ¾" from the other edge to center the holes for the bits. I used a 1½" Forstner bit to drill ¾" deep holes for the bigger bits, followed by a 5⁄16" hole in the center of each hole to accommodate the shank. For the smaller router bits, I drilled holes of the appropriate sizes along the ¾" centerline. I mirrored the layout and drilling in the lid so it would fit over any projecting guide bearings and so forth.

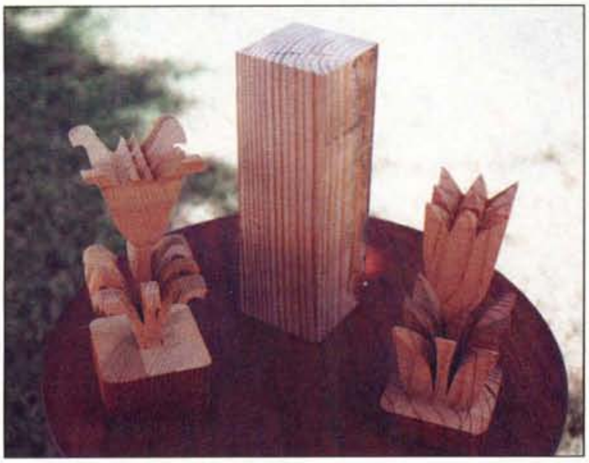
I bandsawed the handle from a 1" X 2½" X 4¾" block and applied spare hinges and a latch that I had in my garage.

The length and layout can be adjusted to fit the needs of any shop.

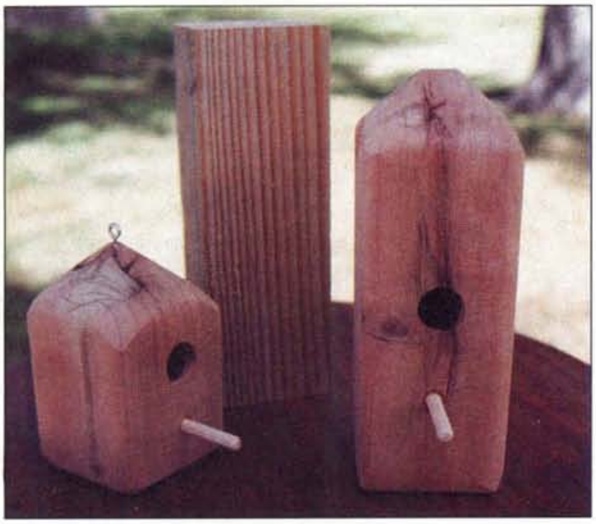
Chris J. Appelhans, Hays, Kansas

## Flowers and Birdhouses

I have found 4 X 4 cutoffs to be the most useful pieces of wood in the scrap pile. One of the things I like to make are these wooden flowers. They are the only flowers in our house because my wife can't kill them. I make a pattern out of Masonite® and transfer it onto two perpendicular sides of the block. Bandsaw one side, keeping the pieces together for support while you then bandsaw the other side.



These birdhouses are also great fun, because if you are careful in the cutting and gluing, most people can't figure out how you made them. Start with a short 4 X 4 and draw a circle on the end, then use a bandsaw to cut a cylinder out of the middle. Cut about 2" off the top and ½" off the bottom of this cylinder, and keep these two pieces.



Carefully line up the grain and glue these two pieces back in place, put glue in the seam and clamp until dry.

Cut the roof angles, being careful not to cut too much material (that's why the top is 2" thick). Drill a hole in the front, then sand and round all the edges on a disc/belt sander. The last steps are to drill a ¼" hole for a perch, and drill two small air holes in the back near the top. Glue in a dowel perch and install a small eyelet with which to hang your birdhouse.

Lynn Miner, Albuquerque, New Mexico

## Wooden Coin Bank

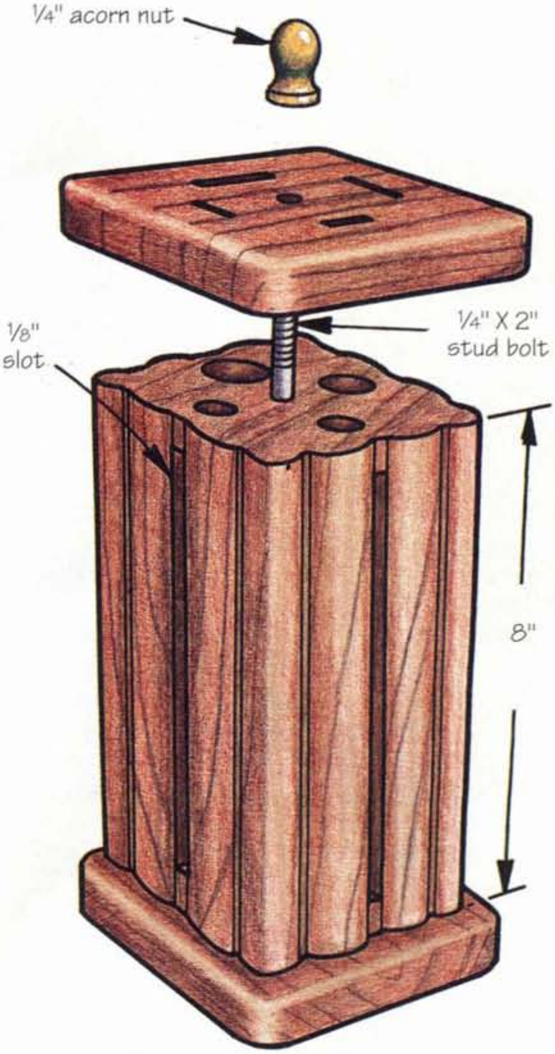
This bank was a fun project to work on while teaching my teenage daughter about power tools. It gave us a chance to spend time together, and opened up the woodworking world to her.

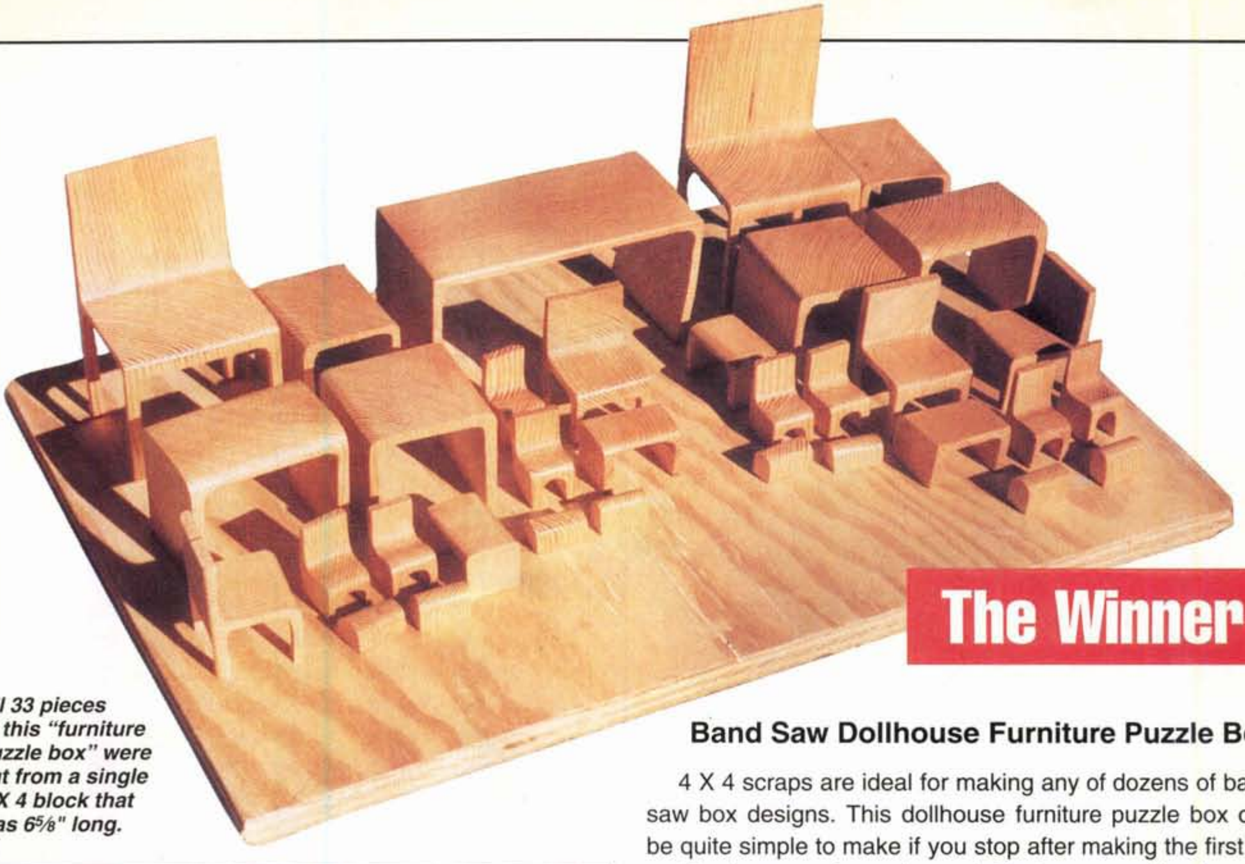
Take your 4 X 4 and plane it equally on all four sides. Then cut it to length, as shown, using a miter box for squareness. Place your coins on one end of the 4 X 4, centered side to side and ⅛" from the edge, and trace around them. Use appropriate spade bits in the drill press to drill the holes as deep as you can—preferably all the way through.

Set up a ⅛" straight bit in the router, and cut slots in the sides so you can see the coins; then change bits and cut the decorative veining, and round over the corners.

Make a top and a base from ¾" material that measures a full 4" X 4". Locate and cut slots in the top that will line up with the holes. Drill through the top in the center so it will fit down over a stud bolt screwed into the bank. Use an acorn nut to secure the top on the stud bolt, and attach the bottom with screws.

Mark W. Dykes, Eaton, Ohio





***All 33 pieces of this "furniture puzzle box" were cut from a single 4 X 4 block that was 6⅝" long.***

# The Winner

## Band Saw Dollhouse Furniture Puzzle Box

4 X 4 scraps are ideal for making any of dozens of band saw box designs. This dollhouse furniture puzzle box can be quite simple to make if you stop after making the first 11 or 13 pieces, or it can be as intricate as you like. I made one that has at least 45 pieces—probably over 50, but I stopped counting. It's sort of a three-dimensional jigsaw puzzle that can only go together one way, and can be quite a challenge.

Once you understand the basic cuts, you don't have to worry about the dimensions, just cut them as fine as you can and keep on repeating the process until you can't stand it anymore. To make the really intricate ones, you need to use a ⅛" blade or smaller. Use *push blocks* or wooden "pliers" made of scrap that can be sacrificed if they get in the way of the blade—they're easier to replace than fingers.

Follow the steps closely when you make your first few, or you could end up with missing chair legs or other problems. Once you've mastered the technique, you can make variations; for instance, eliminating Cut F would allow you to make larger Step 4 chairs and the other parts would be larger, thus yielding more parts in subsequent cuts.

Frank Pogue, Virginia Beach, Virginia

### Grand Prize
### Skil Model 1870 2¼ HP Plunge Router

***As the winner of Scrapwood Challenge #6, Frank Pogue will add this powerful, lightweight plunge router from Skil Corporation to his shop equipment. It comes with one-piece ¼" and ½" collets and features on-tool storage for the wrench and a collet lock for easy bit changing.***

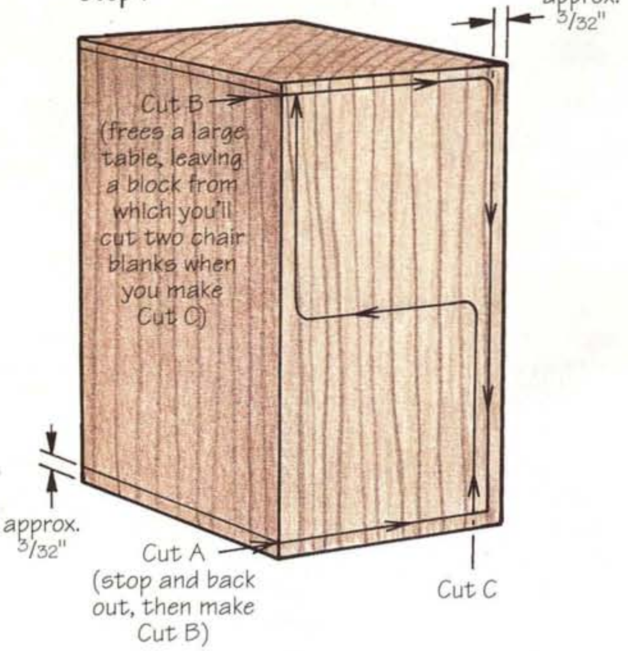
## Scrapwood Challenge #7

You don't want to throw away those thin rippings, do you? Hardwoods are expensive, and wood that beautiful shouldn't be used for kindling. But what are you going to do with those edge pieces left over once you've ripped the material you want from the boards? Sometimes they're rough, and their thickness varies. Sometimes they're smooth and consistent in thickness, left over because your board was just a little wider than you needed. They ought to be good for something...

Tell us what they're good for. Use those rippings from ¾" material in a project of your own design. They can range from ⅛" to 1" thick, and you can use other materials and hardware as well. Let's see if we can clear up some floor space on the left side of your table saw. Send a dimensioned sketch of your design, tell how you built it, include a sharp, well-lit photo (or send us the piece so we can photograph it), and you could end up winning a power tool for your shop. If we use your project, we'll add a year to your subscription. Honorable Mentions will receive a *PW* T-shirt and a monogrammed binder that holds 12 issues.

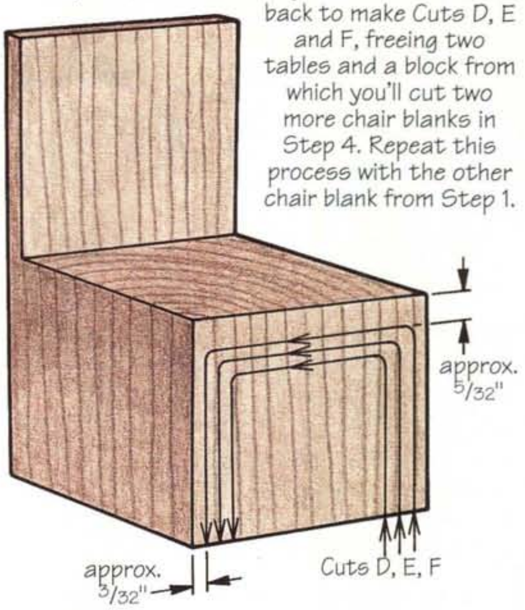
Entries must be received by March 24, 1993; notification of winners will be by publication in the July 1993 issue. Send to: Scrapwood Challenge #7, 1041 Shary Circle, Concord, CA 94518. Entries become the property of *Popular Woodworking*, and the decision of its editors is final.

**Step 1**


approx.
3/32"
Cut B
(frees a large table, leaving a block from which you'll cut two chair blanks when you make Cut C)
approx.
3/32"
Cut A
(stop and back out, then make Cut B)
Cut C

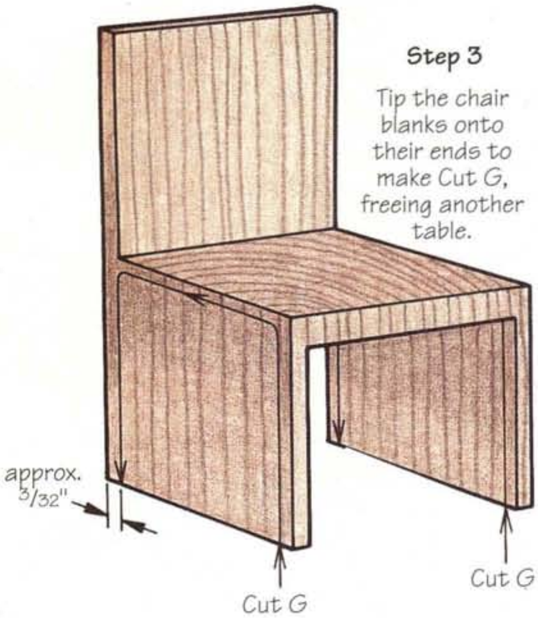
**Step 2**

Lay a chair blank on its back to make Cuts D, E and F, freeing two tables and a block from which you'll cut two more chair blanks in Step 4. Repeat this process with the other chair blank from Step 1.



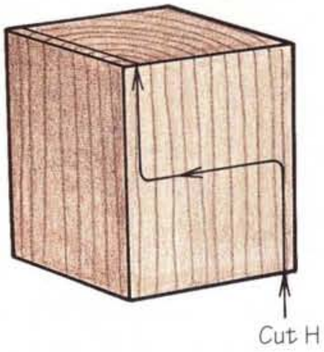
**Step 3**

Tip the chair blanks onto their ends to make Cut G, freeing another table.



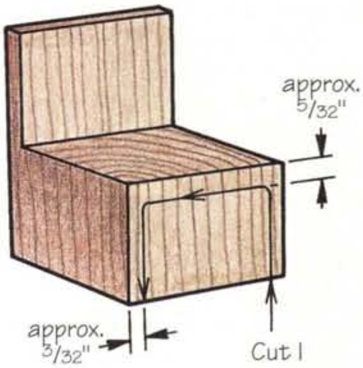
**Step 4**

Cut the block left over from Step 2 into two chair blanks.



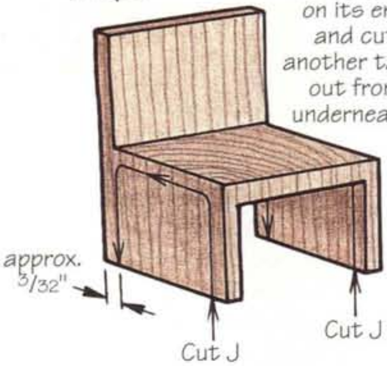
**Step 5**

Cut a block out from under the chairs to use in Step 7.



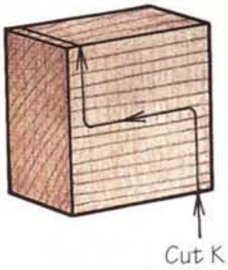
**Step 6**

Turn a chair on its end and cut another table out from underneath.



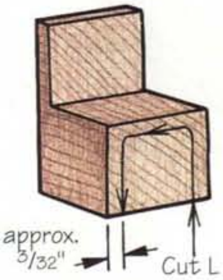
**Step 7**

Cut the block from Step 5 into chair blanks.



**Step 8**

Keep going until you can't cut any more.



# SASSAFRAS

### by Ken Textor

The smell of sassafras has defined this hardwood's uses for centuries. It's been touted as everything from a cure for malaria and infertility to a necessary flavoring in Cajun cooking and an indispensable spring tonic.

For woodworkers, though, sassafras is an under–utilized hardwood that has some genuinely indispensable characteristics woodworkers often need.

## General Description

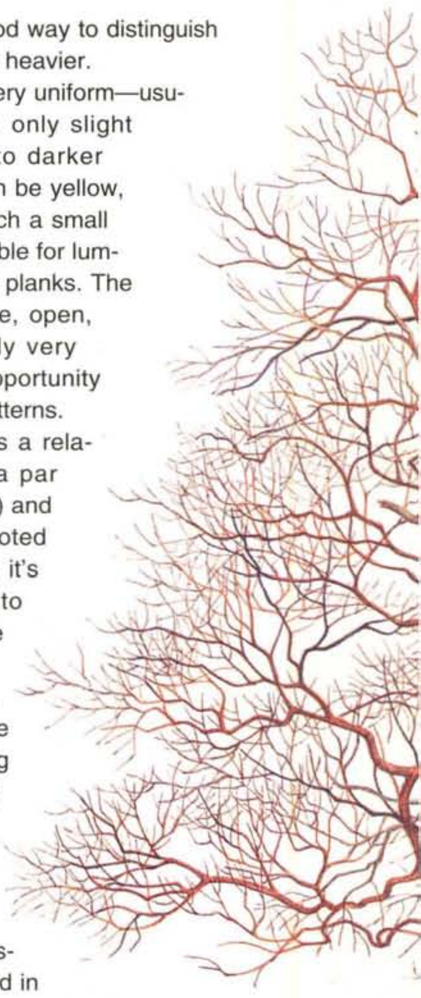
There's only one species of sassafras (*sassafras albidum*) native to North America. Two Asian species are sometimes planted as ornamentals, but are of no consequence to woodworkers. When you ask for sassafras at a lumber yard, that's what you get. It has no modern nicknames and, although sometimes visually confused with black ash, its distinctive smell sets it apart from all other woods.

This is also a wood that you needn't feel environmentally guilty about using. It grows quickly, often on poor sandy soils, from dense woodlands to peaty swamps, though it prefers rich loamy soils in lowlands and midlands. It's usually among the first species to start filling in recently cleared forests.

The tree usually grows from 30 to 60 feet in height, with 100–foot specimens fairly common. It is abundant in the South, generally east of the Mississippi, but ranges as far north as southern New England and the Midwest. The tree is easily identified by its large leaves, resembling one, two, and three–lobed mittens.

The wood itself is fairly light, moderately hard, somewhat strong and quite shock resistant. Its most important characteristic is its resistance to decay and insect attack, which is rated as high as white cedar's (see *PW* #65). Its relatively light weight is another good way to distinguish it from ash, which is much heavier.

***Ken Textor** works wood in Arrowsic, Maine.*



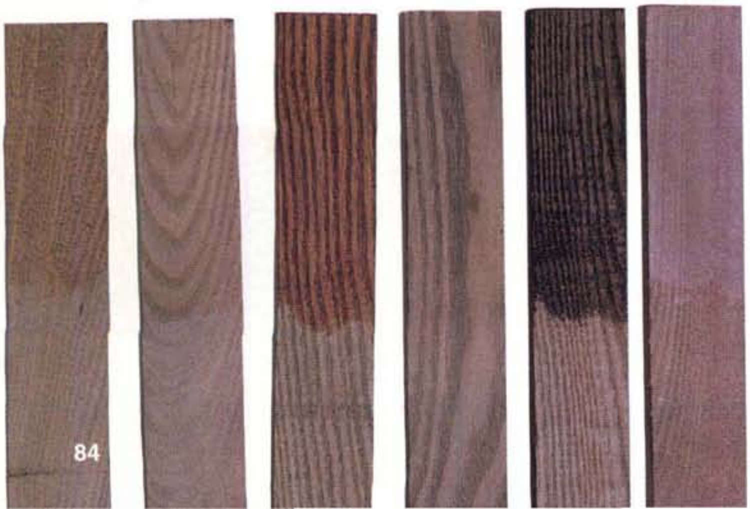
Color in sassafras is very uniform—usually grayish brown, with only slight variations from lighter to darker shades. The sapwood can be yellow, but usually represents such a small portion of the wood available for lumber that it's rarely seen in planks. The fairly tight grain is coarse, open, well–defined and usually very straight, leaving little opportunity for interesting figure or patterns.

Once dry, sassafras is a relatively stable wood, on a par with spruce (See *PW* #68) and some other softwoods noted for their stability. Though it's not particularly difficult to steam bend, it does have a tendency to split when put through hard curves. You can usually solve the problem by obtaining green sassafras or using air–dried lumber.

As you might expect, many of the traditional uses of sassafras take advantage of its rot resistance. It's commonly found in barrels, buckets, boat planking, feed troughs, fence posts and lawn furniture. Early Native Americans prized the wood as a source for dugout canoes, and colonials valued it for medicinal uses. The oils in the wood were believed to cure many ailments.

## Working Properties

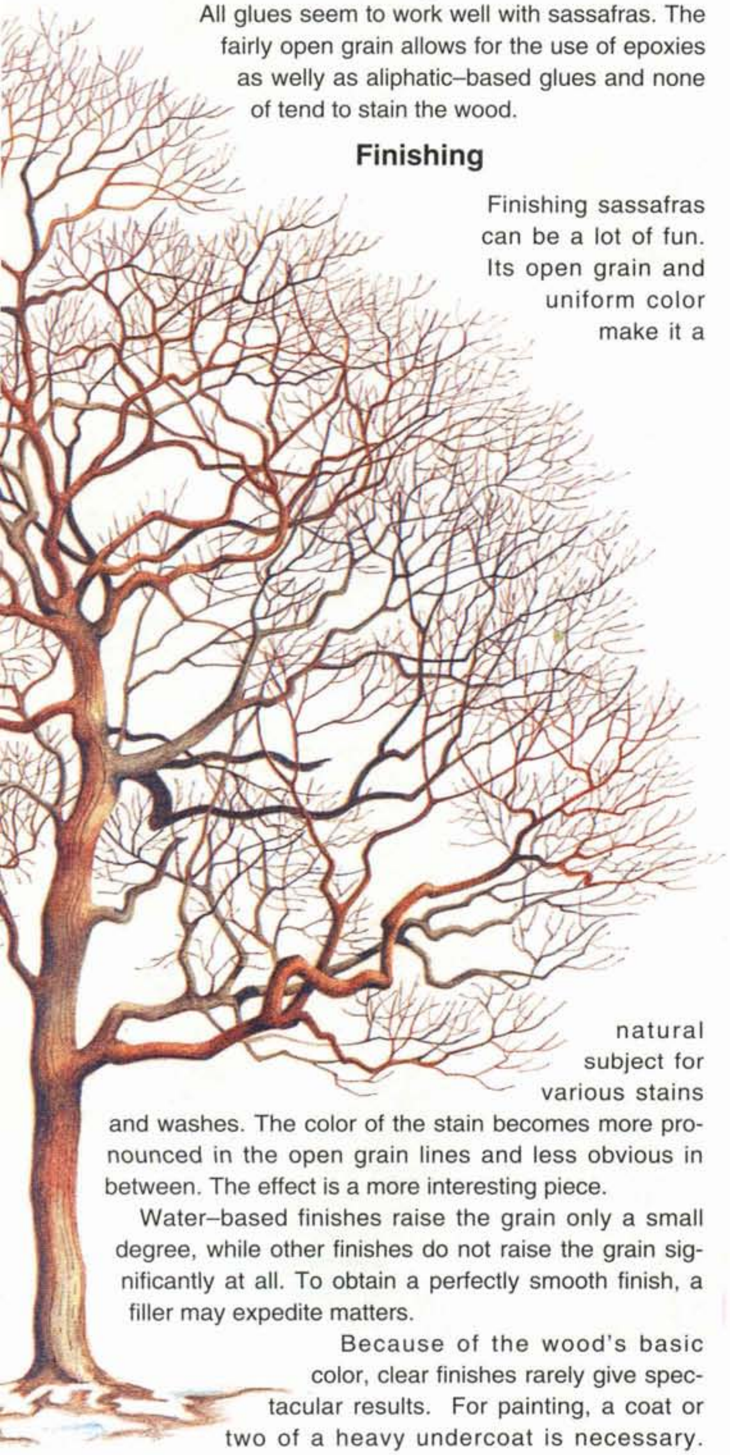
Working sassafras is largely a pleasure, particularly if you appreciate its sweet, somewhat minty root beer smell. It planes easily, with virtually no chipping due to the straight grain. It resists sanding dips well, and a smooth finish is fairly easy to obtain. Ripping and cross–cutting sassafras presents no obvious problems though some literature on sassafras reports it to be a bit prone to "shaking," or spontaneously splitting, when sawn.



Turning sassafras has its problems, however. Because of its coarse grain, turned wood shavings tend to come off in chunks, leaving a pitted surface you may find hard to sand out. Taking very small amounts off the surface with a very sharp turning chisel should minimize but not eliminate the problem. Varying the speed of the lathe doesn't seem to make a difference.

Sassafras stands well with fasteners and resists splitting even when screws are driven in without pilot holes. The wood displays an excellent ability to hold both nails and screws. Lubricants for fasteners are unnecessary, probably due to the oils in the wood. These oils also account for the wood's resistance to staining around iron fasteners.

All glues seem to work well with sassafras. The fairly open grain allows for the use of epoxies as welly as aliphatic–based glues and none of tend to stain the wood.



## Finishing

Finishing sassafras can be a lot of fun. Its open grain and uniform color make it a natural subject for various stains and washes. The color of the stain becomes more pronounced in the open grain lines and less obvious in between. The effect is a more interesting piece.

Water–based finishes raise the grain only a small degree, while other finishes do not raise the grain significantly at all. To obtain a perfectly smooth finish, a filler may expedite matters.

Because of the wood's basic color, clear finishes rarely give spectacular results. For painting, a coat or two of a heavy undercoat is necessary. Without it, the grain lines show through, something you want to avoid when attempting to get a smooth painted surface.

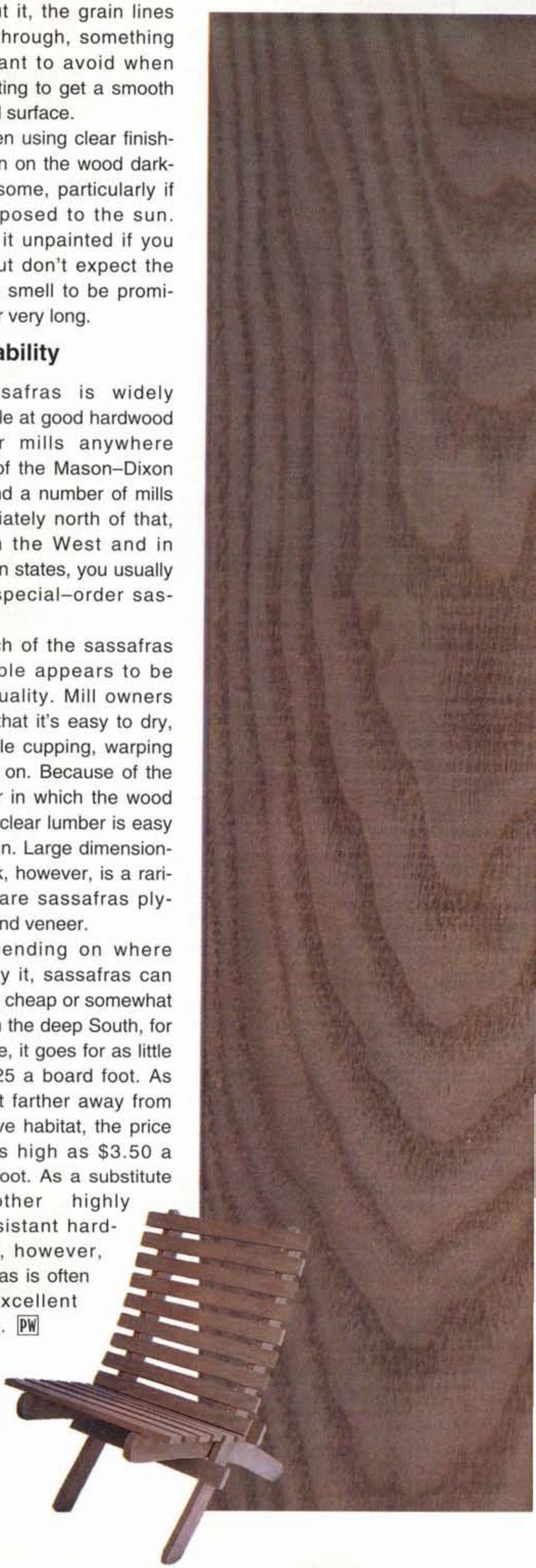
When using clear finishes, plan on the wood darkening some, particularly if it's exposed to the sun. Leave it unpainted if you like, but don't expect the wood's smell to be prominent for very long.

## Availability

Sassafras is widely available at good hardwood lumber mills anywhere south of the Mason–Dixon line, and a number of mills immediately north of that, too. In the West and in northern states, you usually must special–order sassafras.

Much of the sassafras available appears to be high quality. Mill owners report that it's easy to dry, with little cupping, warping and so on. Because of the manner in which the wood grows, clear lumber is easy to obtain. Large dimensional stock, however, is a rarity, as are sassafras plywood and veneer.

Depending on where you buy it, sassafras can be very cheap or somewhat dear. In the deep South, for instance, it goes for as little as $1.25 a board foot. As you get farther away from its native habitat, the price gets as high as $3.50 a board foot. As a substitute for other highly rot–resistant hardwoods, however, sassafras is often an excellent bargain. PW



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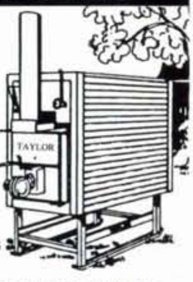

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## Index to Advertisers

Cascade Tools, Inc. .......... 14
Crafter's Mart .......... 89
Craft Supplies USA .......... 58
Cryderman Productions. .......... 89
Cupboard Distributing .......... 89
Econ–Abrasives .......... 15
Grizzly Imports, Inc. .......... 2
Enlon Import Co .......... Back Cover
MLCS Ltd. .......... 11
NRI Schools .......... 13
Phone Technologies .......... 9
Popular Woodworking Back Issues .20
Popular Woodworking Binders .......... 14
Rodale Press .......... 42
Tole World .......... 3
Warren Tool Co., Inc. .......... 89
Weekend Woodcrafts .......... 91
Woodmaster Tools, Inc. .......... 15
Wood–Mizer .......... 89
The Woodworking Shows .......... 89
Woodworks .......... 15

## CLASSIFIED INFORMATION:

**Classified Rate:** $2.50 per word; 15–word minimum. **One–Inch Marketplace:** $250 per issue. Payment must accompany all ads (not commissionable). Deadline for Issue #72 (May 1993) is Feb. 1, 1993. ***Popular Woodworking***, Dept. Class., 1041 Shary Circle, Concord, CA 94518. (510) 671-9852

# Calendar

## Events of Interest to Woodworkers

If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in *Calendar* free of charge.

### CALIFORNIA

**Wildfowl Arts Festival:** (2/13-14) at the San Diego Princess Resort, San Diego, CA

**Contact:** Pacific Southwest Wildfowl Arts, 3852 Pacific Ave., Long Beach, CA 90807. Tel. (310) 427-2867

**Woodworking Machinery Exposition:** (2/26-27) C.B. Tool & Supply, 90 Karina Ct., San Jose, CA 95131

**Contact:** Randy Metzler, Tel. (408) 436-0707

### FLORIDA

**Woodworking Show:** (3/26-28) at the Orlando Centroplex Civic Center, Livingston St., Orlando, FL

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

**Woodworking Show:** (2/26-28) Florida State Fairgrounds, Special Events Center, 4800 U.S. Hwy. 301 N., Tampa, FL 33610

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

**Woodworking Show:** (3/5-7) Civic Auditorium, Exhibition Hall, 300 W. Water St., Jacksonville, FL 32202

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### GEORGIA

**Woodworking Show:** (3/12-14) Gwinnett Civic Center, 6400 Sugarloaf Pkwy., Duluth, GA 30136

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### ILLINOIS

**Woodworking Show:** (2/26-28) at The Illinois State Fairgrounds, Eighth St. and Sangamon Ave., Springfield, IL 62702

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

**Woodworking Show:** (2/12-14) Gateway Center, Center Hall, One Gateway Dr., Collinsville, IL 62234

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

**Woodworking Show:** (3/26-28) Odeum, North Hall, 1033 N. Villa Ave., Villa Park, IL 60181

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

**Woodworkers Tour:** (5/17-31) Tour England and Germany: Sheffield, Stratford, Black Forest. Deadline to register—(3/10).

**Contact:** Buford Mooberry, 2514 E. Muller Rd., East Peoria, IL 61611. Tel. (309) 266-6575

### INDIANA

**Woodworking Show:** (3/19-21) at The Allen County Memorial Coliseum, 4000 Parnell Ave., Fort Wayne, IN 46805

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

### MARYLAND

**Woodworking Show:** (4/2-4) at the Pikesville Armory, Pikesville, MD

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

### MASSACHUSETTS

**Craft Fair:** (5/21-23) Worcester Center for Crafts, 25 Sagamore Rd., Worcester, MA 01605

**Contact:** Craft Fair Registrar, 25 Sagamore Rd., Worcester, MA 01605. Tel. (508) 753-8183

### MICHIGAN

**Woodworking Show:** (2/5-7) at the Grand Rapids Jr. College Fieldhouse, 11 Lyon NE, Grand Rapids, MI 49503

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

### MISSOURI

**Woodworking Show:** (4/2-4) American Royal Center, Governor's Building, 1701 American Royal Ct., Kansas City, MO 64102

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### NEW YORK

**Woodturner's Symposium:** (6/25-27) at the New York State University, Purchase, NY

**Contact:** American Association of Woodturners, Mary Redig, Administrator; 667 Harriet Ave., Shoreview, MN 55126. Tel. 612-484-9094

**Woodworking Show:** (2/6-7) at Hofstra University, 100 Fulton Avenue, Uniondale, NY 11553

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

### NORTH CAROLINA

**Country Workshops:** Swiss Cooperage (2/8-12), Ladderback Chairmaking (2/22-27), Windsor Chairmaking (3/8-12), Advanced Chairmaking (3/22-27) at Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753

**Contact:** Country Workshops, Tel. (704) 656-2280

**Folk School Workshops:** Woodworking: Fundamentals (2/9-25), Bowls (2/28-3/6), Shaker Boxes (3/7-13), Mountain Dulcimer (3/14-20), Shaker Rocker (4/4-9). Woodcarving: In the Round (2/28-3/6) & (3/7-13), Mountain Animals (3/14-19) & (3/19-21), Basics (3/21-27) & (3/28-4/3), Carve a Dog (4/4-9), at the John C. Campbell Folk School.

**Contact:** The John C. Campbell Folk School, Rt. 1. Box 14A, Brasstown, NC 28902. Tel. (800) FOLK SCH

### PENNSYLVANIA

**International Lathe-Turned Objects Challenge V:** (1/28-4/31) Berman Museum of Art at Ursinus College, Collegeville, PA.

**Contact:** The Wood Turning Center, P.O. Box 25706 Philadelphia, PA 19144. Tel. (215) 844-2188

**Craft Buyers Market:** (2/19-22) at The Philadelphia Civic Center, Philadelphia, PA

**Contact:** The Rosen Group, 3000 Chestnut Ave., Ste. 300, Baltimore, MD 21211. Tel. (410) 889-2933

**Woodworking Show:** (3/19-21) Farm Show Complex, East Building, Cameron & Maclay Sts., Harrisburg, PA 17110

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### SOUTH CAROLINA

**Woodworking Show:** (2/19-21) at Exchange Park, Hwy. 78, Ladson, SC 29456

**Contact:** Woodworking World, Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

# Calendar

### TENNESSEE

**Spring Workshop Program:** Woodturning (3/1-5), (3/15-19) & (3/22-26), Bowl and Plate Turning (3/8-12). Arrowmont School of Arts and Crafts, Box 567, 556 Parkway, Gatlinburg, TN 37738-0567

**Contact:** Arrowmont School of Arts and Crafts. Tel. (615) 436-5860

**Hardwood Workshops:** Hardwood Flooring (3/8), Bowl Turning (3/8), Built-in Cabinetry, Hardwood Moldings & Paneling (3/29) at the Timberline Lumberyard, 3636 Division St. West Knoxville, TN 37939

**Contact:** Timberline Forest Products, Inc. P.O. Box 11171, Knoxville, TN 37939. Tel. (615) 637-3332

### TEXAS

**Woodworking Show:** (3/12-14) at Adams Mark Hotel, 2900 Briarpark at Westheimer, Houston, TX 77042

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

**Woodworking Show:** (2/19-21) Fair Park, Tower Bldg., 3809 Grand Ave., Dallas, TX

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### WASHINGTON D.C.

**Woodworking Show:** (2/12-14) at Hyatt Regency Crystal City, Jefferson Davis Hwy., Arlington, VA 22202

**Contact:** Woodworking World, P.O. Box 796, Plymouth, NH 03264. Tel. (603) 536-3768

### WISCONSIN

**Woodworking Show:** (2/5-7) MECCA Arena, 500 W. Kilbourn Ave., Milwaukee, WI 53203

**Contact:** The Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. Tel. (310) 477-8521

### GERMANY

**World Fair:** Wood and Forestry Machinery and Equipment (5/19-25) Hanover Fairgrounds, Hanover, Germany

**Contact:** Hannover Fairs USA, Tel. 609-987-0092

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# Paying One's Dues

Elementary shop class with Mr. Davis meant fun; we could build anything we wanted, as long as it was a plant stand or an ashtray. He'd look at my work, cringe, think up something positive to say. I dreamed of using the *big* saw—a Delta Unisaw—that only sixth graders were allowed to touch.

For a prank, I stuck a wad of gum on the motor. I was sure he'd noticed, but he smiled, almost like he saw some promise in what I'd done. Then, with a twinkle in his eye he scowled at me and—calloused hands, pencils sharpened to a needle point in his engineer's coverall pocket—spoke.

"I don't know how you're going to make it," he grumbled. "If you're going to make it in this trade, you'll have to pay closer attention to what you're doing."

"What do you mean, 'make it'?"

He ran the calloused hands through his thinning hair and heaved a sigh. "One of these days, if you're good enough, you'll make it. The way you're going now, you should be taking home economics. Pitch that ashtray and start over!"

I met Mr. Davis again in junior high. This time he let me use the table saw—and regretted it as the pieces flew backward at close to the speed of sound. "Wouldn't baking bread be safer?" But I kept on, trying to learn, trying new machines, trying his patience.

High school was different. He taught there, too, but saw me coming, and put in for a transfer. My reputation as the only student who could put a square peg in a round hole, spread far and wide. He didn't get the transfer.

This time he taught me to use a panel sander and calibrate the table saw. Final exam consisted of rebuilding an air compressor. Strange then for a wood shop. I wouldn't understand that for a long time to come, but he gave me no bum steers. At graduation he gave me a vernier caliper and instructions for using it. It was an old one, meticulously machined in brass. "It gets in the way, collecting dust. I thought you'd like it."

I read the inscription on the back, engraved by a first–rate jeweler, *To my grandson, Jeff Davis. You'll make it someday.* Something got in my eye; it started watering. "Don't worry. You'll make it, God help us all."

He lined me up a job at the local building truss company. It lasted a whole week. Then I moved to a company that built picnic tables. Three years later, I got lucky and landed a union apprenticeship.

The union wasn't happy with my attitude, and less so with the way I set up the machines. But the shop steward took pity and showed me the ropes. It wasn't long before he went to bat for me, and a few oldtimers let me into their little family. I found out that using a machine was only part of the job. The real trick is learning to work well with the crew.

Small setbacks here and there can bankrupt a skilled woodworker, though he does nothing wrong. People can be just plain contrary. Success goes to the man who persists longest and polishes his craft. I picked up the pieces and moved on. To my surprise I landed a job at the elementary school—as a woodshop teacher. "They need a patient professional woodworker. They'll help you get the teaching certificate once you work on contract with them for a while. They're tough, though."

"So what's new?"

The same old shop building with holes in the roof, the same old machines, and the same wad of gum on the motor made me feel like a time traveler finally home. But I'd developed gray hair, a potbelly, and chewed–off fingernails.

I ran a few boards through the Unisaw (finally!) and decided it needed a little adjustment. An hour later, it was cutting right—the way he would have wanted it. I cleaned it with a sense of worship, making sure the gum wasn't disturbed. Did he learn on this salty old veteran saw? Was that where he learned the craft that made him legendary?

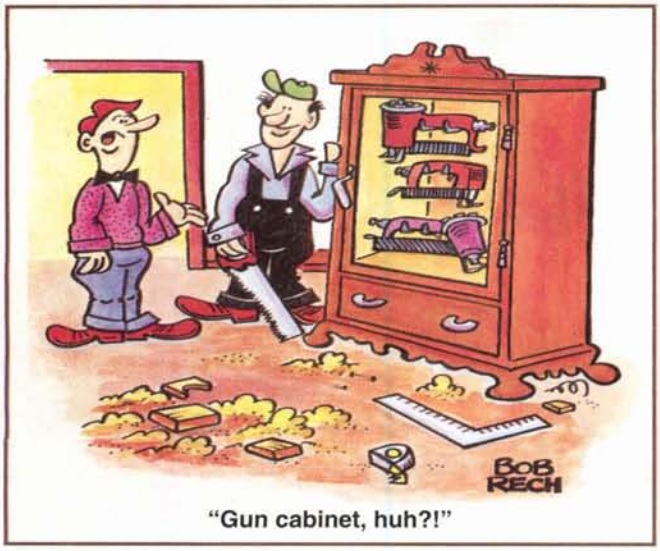
One of the kids dropped a chunk of 2 X 4 on the blade and it slammed into the wall. I chewed him out a bit.

The new crop of kids seemed to have promise, if they'd quit sharpening their pencils on the belt sander. I knew how he felt. Then I got a surprise in the teachers' lounge as I sat behind a screen sipping coffee.

"Have you seen the new shop teacher?" asked a young female voice. "I hear he was a student here and really wants to make things happen."

"Yeah, said a second voice. I'm glad he's here. These old pros are pretty smooth."

I leaned back in the chair and took the most satisfying sip of coffee in my life. I'd made it. PW



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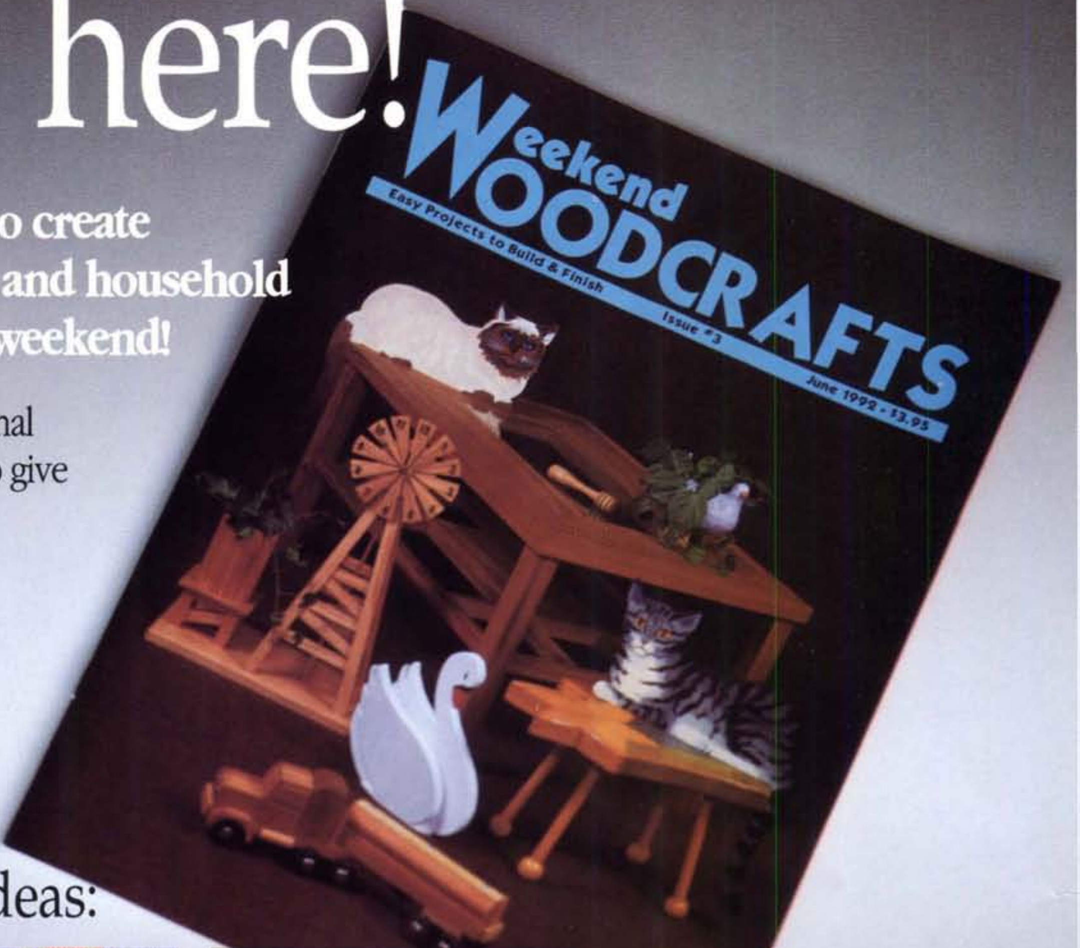

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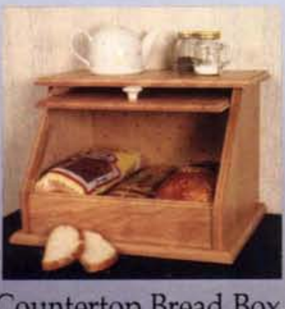

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